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GUIDE TO CANADIAN AEROSPACE RELATED INDUSTRIES

AUGUST 1990

UNITED STATES AIR FORCE
SYSTEMS COMMAND
LIAISON OFFICE

UNITED STATES ARMY
RESEARCH, DEVELOPMENT AND
STANDARDIZATION GROUP

OTTAWA, ONTARIO, CANADA

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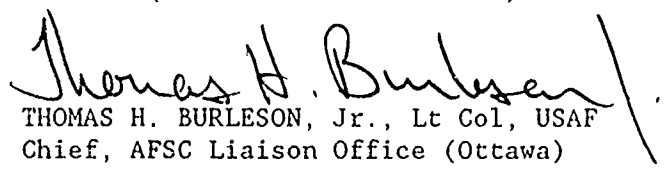
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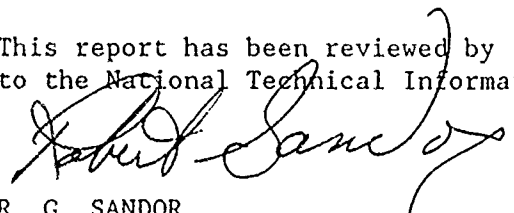
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THOMAS H. BURLESON, Jr., Lt Col, USAF

Chief, AFSC Liaison Office (Ottawa)

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R. G. SANDOR

Director, Defence Programs Division

Defence Programs and Advanced Technology Bureau

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PREFACE

This guide to Canadian Aerospace-Related Industries presents a compilation of descriptive data on 256 companies located in Canada that have expressed interest in doing business with the United States Air Force and Army. This guide has been prepared with three main objectives in mind:

- a. To encourage Air Force and Army Project Officers to take advantage of the industrial capability of Canada.
- b. To engender interest with the USAF and USA for participating in the US/Canada Defense Production and Development Sharing Programs.
- c. To encourage Canadian aerospace industry to take a more active role in presenting their capabilities to the USAF and USA.

The companies profiled in this guide represent a cross section of Canadian industry and research facilities with capabilities that may be of interest to the USAF and JSA research and development and logistics communities.

Comments and/or suggestions concerning the format or content of this guide are solicited. Questions concerning the US/Canada Defense Production and Development Sharing Program or the subject matter of this guide should be directed to Lt Col Thomas H Burleson or Mr Donald J Pearson, AFSC Liaison Office, Suite 202, 110 O'Connor Street, Ottawa, Ontario, Canada K1P 5M9. Telephone contact can be made at (613) 993-7725 or AUTOVON 843-7725. Telefax is available at (613) 990-6787 or AUTOVON 840-6787. EMAIL is available through BURLESON@HQAFC-VAX.AF.MIL.

US Army-related inquiries should be directed to Col G M Mullen or Mr Lloyd Campbell, USARDCG-C, 101 Colonel By Drive, Ottawa, Ontario, Canada K1A 0K2. Telephone contact can be made at (613) 992-5737 or AUTOVON 842-5737. Telefax is available at (613) 992-7327 or AUTOVON 842-7327.

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Section I

INTRODUCTION

One of the functions of the Air Force Systems Command Liaison Office (Ottawa) and the US Army Research, Development and Standardization Group-Canada is to stay current on Canadian industrial capabilities and trends and to make this information available to the USAF and USA R&D community. This guide was prepared in pursuit of that objective. It presents descriptive data on 256 companies that have expressed interest in doing business with the USAF and USA. All information was provided by each of the respective companies. Leads to new entries were obtained through newspapers, magazines, and through contacts with various departments of the Canadian Government. This guide presents a representative cross-section of the Canadian aerospace and defense industry.

Defense economic cooperation between the United States and Canada has deep roots. In the late 1950s, the governments initiated an agreement that has come to be called the Defense Production Sharing Arrangement (DPSA). The DPSA was historic in that it became US defense procurement policy to consider Canadian defense contractors as an integral part of the US industrial/mobilization base. The terms of this arrangement remain valid today. Canadian contractors are to be considered the same as domestic American suppliers. The Buy American Act is waived for all defense supplies made in Canada. US customs duties are waived on most Canadian supplies entering the US for defense programs. The specifics of the arrangement are valid for both Canadian prime contractors and for Canadian subcontractors to US primes. The DFAR Section 25.71 and service supplements thereto apply to this program. The letter agreement itself is contained in DFAR Appendix T.

Under the procedures of the DPSA with Canada, the US buyer contracts with the Canadian Commercial Corporation (CCC). CCC is 100% government-owned and a Crown Corporation — basically an arm of the Canadian Government. CCC wholly sub-contracts the work to the Canadian defense contractor. In the process, CCC guarantees the performance of the Canadian contractor, and if necessary, will re-procure at CCC's expense to get the job done. The DPSA provides US acceptance of all Canadian government contracting and contract management procedures. CCC and their associates with the Canadian Department of Supply and Services certify all pricing data supplied by the Canadian contractor. There are bilateral arrangements for quality assurance, in-plant inspection, and security for classified programs.

There is a second special arrangement with Canada called the Defense Development Sharing Arrangement (DDSA). The DDSA was signed by both governments in November 1963. The Development Sharing Program enjoys all the benefits of the Production Sharing Program. In addition, projects under the DDSA receive financial assistance from the Canadian government. Project agreements are negotiated for each effort and generally reflect a 50/50 cost sharing ratio. The jointly funded projects support US defense requirements, and the US project office remains the design authority throughout the effort. The DDSA is also contained in DFAR Appendix T. Use of the DDSA can really stretch your R&D dollars, an important consideration in the face of declining defense budgets.

The DPSA and DDSA have received high-level support from all administrations. The joint declaration by the Prime Minister of Canada and the President of the US at the Quebec Summit on 18 May 85 stated that "...To provide for an effective use of resources and to aid both our countries in bearing our share of the Allied defense burden, we reaffirm the Canada/United States Defense Development and Production Sharing Arrangements and agree to strengthen our North American defense industrial base." Similar expressions of support have come from subsequent summit meetings.

All project officers are encouraged to take full advantage of these arrangements with Canada and to submit Canadian sources for their projects. Please feel free to contact the AFSC Liaison Office (Ottawa) or the USARDCG-C to assist in locating sources or in other aspects of the arrangements. Please use the addresses noted in the preface to this report. The international cooperative R&D focal point located at your organization can also provide insight in the process of doing business with Canada.

Information on the DPSA and DDSA and Canadian sources can also be obtained from the Defence Programs Division of External Affairs and International Trade Canada at (613) 996-1814 or AUTOVON 846-1814. Their mailing address is:

Defence Programs Division (TDP)
Defence Programs and Advanced Technology Bureau
External Affairs and International Trade Canada
125 Sussex Drive
Ottawa, Ontario
Canada K1A 0G2

The Government of Canada maintains Trade Counselors at many locations in the US. Please contact these individuals as well for more information on Canadian industry.

For the most part, Canada's high-technology industrial capability is on an even par with that of the United States, but on a smaller scale. It may certainly be considered another source base for USAF and USA R&D procurements, as well as for commodity buys. It is hoped that this Guide will help provide the user with some insight into the Canadian system and encourage its use if deemed appropriate. Increased competition and "new blood" can reduce USAF and USA procurement costs and lead to better products.

Section II

COMPANY PROFILES

AASTRA CORPORATION

ADDRESS: 1685 Flint Road
Downsview, Ontario
Canada M3J 2W8

CONTACT: Mr F. S. B. (Hugh) Scholaert, Director, Business Development
Tel: (416) 736-7070
Fax: (416) 736-1778

KEYWORDS: Ceramics; Piezoelectric; Transducers; Acoustic; Systems Engineering; Software; Simulation; Object Oriented Programming; Aeronautical Engineering; Structures; Materials.

HISTORY: Aastra Corporation was incorporated in 1988 to provide goods and services to the defense, aerospace, and electronics industries. Aastra activities are divided into materials manufacturing (Aastra Advanced Ceramics Inc) and engineering services (Aastra Aerospace Inc).

Aastra Aerospace, based in Toronto, Ontario, was originally incorporated in 1970 as H. Aass Aero Engineering Ltd. The company name was formally changed to Aastra Aerospace in January 1988.

Aastra Advanced Ceramics was previously known as Almax Industries Ltd. Originally incorporated in 1964, this company was acquired by Aastra in September 1988.

CAPABILITY: Aastra Advanced Ceramics, based in Lindsay, Ontario, is a major North American producer of piezoelectric ceramics. Aastra ceramics based on lead-zirconate titanate (PZT) compositions are used in acoustic transducers for sonar, sonobuoys, and hydrophones. Aastra produces in excess of one metric ton of PZT per day to DOD-STD-1376 for Navy types I, II, and III materials.

Aastra Aerospace, based in Toronto, provides systems engineering and contract R&D services. Expertise are defense operations simulation based on object-oriented coding principles, advanced materials (structural and electronic ceramics), and aviation systems. Major programs at Aastra Aerospace currently include space based radar and space station.

AVERAGE WORK FORCE. Post Graduate Engineers - 10
Graduate Engineers - 2
Other - 60

GROSS SALES: 1988 - \$4.0M
1989 - \$5.1M

PLANT SIZE. 30,000 sq ft (manufacturing-Lindsay)
5,000 sq ft (offices and lab-Toronto)

EQUIPMENT: Equipment at the Lindsay plant includes Eirich mixers (2); hydraulic presses (2); Electric kilns (8); gas-fired kilns (7); grinders (12); and computer aided testing equipment. The Toronto facility has Microvax, Sun, IBM, and HP computer workstations, a TEMPEST facility, and a materials laboratory.

EXPERIENCE: Aastra Advanced Ceramics current clients include Magnavox Government and Industrial Electronics, Fort Wayne, Indiana; Sparton Electronics, DeLeon Springs, Florida; Raytheon Submarine Signal Division, Portsmouth, Rhode Island; Westinghouse Oceanic Division, Cleveland, Ohio; Sparton Canada, London, Ontario; Western Marine, Seattle, Washington; Newtech, St John's, Newfoundland; and Defence Research Establishment, Atlantic. The Aastra Aerospace company has the following customers currently: Defence Research Establishment, Ottawa, Ontario; Canadian Space Agency; Canada

Center for Remote Sensing; Royal Canadian Mounted Police; Forest Protection Ltd; Ontario Ministry of Transportation and Communications; and the Department of Fisheries and Oceans.

REVISED: Mar 90

THE ACTON RUBBER Ltd

ADDRESS: 881, Landry Street
PO Box 300
Acton Vale, Quebec
Canada J0H 1A0

CONTACT: Mr Andre Fontaine, Manager Military Contracts
Tel: (514) 546-2776
Fax: (514) 546-3735

KEYWORDS: Rubber Retreading; Rubber Custom Mixing; Rubber Molded Parts; Boots PVC; NBC Footwear.

HISTORY: Founded in 1930 by Alfred Lambert Inc, The Acton Rubber Limited, located in Acton Vale, Quebec, Canada, manufactures a wide range of rubber footwear, industrial molded rubber components, rubber custom mixing, and ice skates.

From its inception, Acton Rubber designed several styles of overshoes and boots to meet the needs of the country's armed forces, police, and field workers.

With the passing years, Acton Rubber has enjoyed continued growth.

- 1947 - Added molded rubbers to its production
- 1967 - Equipped with injection molded machinery.
- 1974 - Awarded first contract of Canadian NBC boots.
- 1980 - Entered the tire retreading market.
- 1983 - Awarded first contract of Canadian NBC gloves.
- 1985 - Produced the Daoust ice skates.
- 1986 - Equipped with Desma injection PVC press.
- 1987 - Awarded a General Services Administration contract.
- 1988 - Awarded first Defense Logistics Agency contract for toxicological agent protective boots.
- 1989 - Awarded first Norwegian contract for overboots rubber chemical protective.

CAPABILITY: Acton Rubber is geared to meet the highly varied requirements of the rubberized products market with an extensive range of standard and specialized equipment, combined with an experienced labor force (300). Their production schedules are flow charted through many processes including carbon black or color mixing, injection or press molding, extrusion or calendaring, cutting, marking, cementing, sewing, making, vulcanization, inspection, and packaging.

Their R&D, laboratory, and engineering staff meet regularly with their counterparts in production, marketing, and sales to determine how best to fulfill their customer's special project requirements in terms of rubber recipes, manufacturing processes, and the properties of the products themselves.

Acton Rubber maintains an active quality assurance program in order to meet NATO quality requirements such as AQAP-4. They also manufacture products to a number of military specifications related to Canadian, American, or foreign country's procurements.

AVERAGE WORK FORCE. Engineering - 12
Quality Assurance - 8
Other - 45

GROSS SALES: 1988 – \$19.6M
1989 – \$22.6M

PLANT SIZE: 260,000 pi²

EQUIPMENT: Their equipment includes 6 mills, 3 extruders, 3 calendars, and 20 presses including compression and injection. The company also has equipment for cutting and sewing.

EXPERIENCE: Canada: National Defence, RCMP, Correctional Service, Department of Transport, Energy Mines and Resources, Fisheries and Oceans, Atomic Energy, Canada Post, Bombardier Ltd, Camoplast Inc, Goodyear Ltd. US: Defense Logistics Agency (DPSC), General Services Administration, Army Red River Depot, Camoplast Rockland Ltd, Goodyear Ltd. Overseas: Minister of Defense UK, Norwegian Army Matcomnor, British Antarctic Survey.

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ADGA GROUP

ADDRESS: 116 Albert St, Suite 400
Ottawa, Ontario
Canada K1P 5G3

CONTACT: Mr J Kevin Burke, PEng
Tel: (613) 237-3022

KEYWORDS: ATC; Communications; Consulting (Nav/Comm); Fire Control; ILS; Radar; Radio Communications; Satellite Communications; Secure Communications; Software Services; Systems Engineering (Nav/Comm).

HISTORY: The ADGA Group was established in 1969 to serve the needs of clients throughout the world. ADGA is privately owned with over two hundred professional and technical employees.

The head office is located in Ottawa, Canada's capital, with branch offices in Montreal, Toronto, and Vancouver. ADGA is able to offer a broad range of services on an international basis.

ADGA is without direct ties to any specific supplier, government, or fiscal agency and offers truly independent and objective consulting services to its clients.

CAPABILITY: The group possesses wide and proven experience in consulting, design, installation, operation, and maintenance of technical facilities for the support of a wide range of domestic and international projects in the electronics and computer systems areas.

Major areas of company expertise include data/voice communications, navigation aids, air traffic control, satellite systems, marine vessel traffic management, security system design, and software development.

In addition, the company has in-house capability in the design of integrated logistics support (ILS) systems, automated configuration management, and AQAP-1 quality assurance consulting. The company works under a variety of business arrangements including industrial development and joint-venture projects and major subcontracts.

AVERAGE WORK FORCE: Professional – 100
Technologists/Technicians – 150
Others – 50

GROSS SALES: No data.

EQUIPMENT: Electronic R&D and test facility and in-house computer systems.

EXPERIENCE: Present customers include all major departments in the Canadian Government as well as numerous departments of the provincial governments and industries in Canada, the US, and overseas.

REVISED: Mar 90

ADVANCED MATERIALS ENGINEERING CENTRE

ADDRESS: PO Box 1618 Station M
Pier 21 Terminal Road
Halifax, Nova Scotia
Canada B3J 2Y3

CONTACT: Manager, Business Development
Tel: (902) 425-4500
Fax: (902) 422-7907

KEYWORDS: Advanced Industrial Materials, Composites Engineering, Composites Fabrication and Testing, Finite Element Methods, CAD/CAM; Pultrusion; Filament Winding; Composite Layup; Autoclaving; Materials Testing; Resin Characterization; Differential Scanning Calorimetry; Thermomechanical Analysis; Thermogravimetric Analysis; Scanning Electron Microscopy; NDE/NDT; Profilometry; Ultra Violet Testing; Accelerated Weather Testing; Coatings; Ceramics; MANTECH.

HISTORY: Advanced Materials Engineering Centre (AMEC) is a "not for profit" corporation founded in 1988 to facilitate technology transfer to Canadian industry in the field of advanced industrial materials. AMEC maintains a critical mass of expertise and equipment to enable them to assist industry in the development and commercialization of products and expertise in advanced materials (composites, coatings, and ceramics.) The founding members of AMEC are Grumman Corporation, Technical University of Nova Scotia, and General Composites Technology.

CAPABILITY: AMEC is primarily involved in the development of automated composite production techniques, in particular, pultrusion, filament winding, and hybrid techniques. Supporting technologies available are plasma/arc/flame spray equipment to provide ceramic, metallic, or plastic coatings; a furnace for ceramic sintering; and an extensive suite of mechanical and thermal testing equipment for the characterization of materials using both destructive and non-destructive evaluation techniques. AMEC also has excellent capability in design engineering with outstanding facilities for finite element methods.

AVERAGE WORK FORCE: PhD – 4
Eng – 5
Other – 6
Secondment from member companies – 8 on average

GROSS SALES: 1989 – \$300K

PLANT SIZE: 18,000 sq ft
10,000 sq ft (office space)

EQUIPMENT: The company maintains the following types of advanced materials-related equipment: NORDIC 4000 lb resin injection pultrusion machine, ENTEC 5-axis filament winder (capable of 20' by 6' dia), United McGill Autoclave 8x4 (ordered for May 1990), two conditioning and post cure ovens, METCO 80 Kw plasma spray with 6-axis robot, plus extensive testing facilities and computer aided engineering equipment.

EXPERIENCE: The company's customer list is extensive and includes Grumman Aerospace Corporation, General Composite Technology Ltd, Technical University of Nova Scotia, UT Technologies Ltd, Vaughan Engineering Associates Ltd, IMP Group Ltd, Rowfibre Ltd, Pratt and Whitney Canada Ltd, APEL Ltd, Amherst Aerospace Inc, Martec Ltd, National Research Council of Canada, Canadian Space Agency, FRE Composites Inc, Fleet Technologies Ltd, J W Cowie Engineering Ltd, Hermes Electronic Ltd, RPS/ABCO Ltd, Cellpack Ltd, MBB Mechanical Services Ltd, Centre for Frontier Engineering Research, and Focal Technologies Inc.

REVISED: Apr 90

AERO MACHINING Ltd

ADDRESS: 5411 Industrial Blvd
Montreal-North, Québec
Canada H1G 3H7

CONTACT: Mr Bruno Julien, Marketing Director
Tel: (514) 324-4260
Fax: (514) 324-9997

KEYWORDS Actuators, Airframe Parts, Die Fabrication, Hinges, Hydraulic Servos, Landing Gear Components, Machining, Missile Parts, Precision Machining; Titanium; Tooling.

HISTORY Aero Machining Ltd is a small machining company incorporated in 1963 in the Province of Quebec. There are no other Canadian or US locations.

CAPABILITY Aero Machining Ltd provides services in tool design, production, maintenance, sub-assemblies, die and mold development, and fabrication. They specialize in precision machining, five-axis profiling, four-spindle profilers, CNC lathes and machining center, high tensiles, titanium, and D-6-AC material. Their quality control is governed by the "Aero Machining Ltd" quality control manual in accordance with MIL-I 45208 and MIL-C 45662A. The company is approved for the manufacture of aircraft hydraulic servos, landing gear components, and missile and airframe machined parts. Accumulative quality control records are kept to provide necessary traceability of inspection data. Their quality control policy is approved to meet the requirements of various US DOD QC specifications, as well as the Canadian DND 1016 (AQUAP-4) specification, for the manufacture of aircraft mechanical parts and mechanical and hydraulic assemblies.

AVERAGE WORK FORCE: Total - 60

GROSS SALES: 1988 - \$4.0M
1987 - \$4.0M

PLANT SIZE: 25,000 sq ft

EQUIPMENT Their equipment includes CNC lathes, borers, milling machines, machining centers (3, 4, and 5 axis), profilers, drills, honing machines, and grinders. They have a hydraulic assembly and test facility for all hydraulic assemblies and parts manufactured by the company. CNC equipment is integrated to a 5 axis CAD/CAM system.

EXPERIENCE: Aero principal customers include McDonnell Douglas Corp, Grumman Aerospace Corp, Pratt & Whitney, Menasco Aerospace, Canadian Marconi, Bell Helicopter, GE, Rolls Royce, Fleet Industries, Canadair, USAF, and Heroux.

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THE AEROSPACE CONSORTIUM Inc

ADDRESS: 730 Gana Court
Mississauga, Ontario
Canada L5S 1N1

CONTACT: Mr W H Reil, President
Tel: (416) 670-1070
Fax: (416) 670-1695

KEYWORDS: Antennas; Avionics; Build to Print; CNC Machining; Communications; Component Fabrication; Composite Fiberglass Components; Configuration Management; Coupler Systems, Electronics Assembly; Engineering Services; Fabrication/Assembly/Test, Fire Suppression Systems; HF Communications; ILS/Integrated Logistic Support; Industrial Benefits; Life Cycle Material Management; Machining; Manufacturing; Mechanical Assembly; Precision Machining; Project Management; R&O (Electronics); R&O (Avionics); Software Services; Subcontract Manufacturing; Technical Publication Production; Whip Antennas, Wiring Harness Fabrication.

HISTORY: The Aerospace Consortium is a group of aerospace companies which jointly market their combined aerospace and defense engineering and manufacturing capabilities. The consortium, which was founded in 1984, is an independent company owned by the member shareholders.

CAPABILITY: The Aerospace Consortium is a group of Canadian aerospace companies who together possess an extensive array

of engineering and manufacturing capabilities which are collectively offered to potential customers through a single source.

Consortium members can provide a range of subcontract services which in combination enable the group to furnish competitively priced, complete assemblies or subassemblies from one responsible source.

Member companies can provide any or all of the following services from their combined resources: precision machining of conventional and exotic materials, mechanical assembly work, electronic system assembly, communications systems design and manufacture, repair and overhaul of electronic/communications systems, specialty light metal fabrication, fiberglass filament winding, hydraulic components and subsystems, pneumatic components and subsystems, program management, and ILS services and software development.

One of the consortium's principal avenues of business development is to establish working relationships with overseas companies who wish to enter into technology transfer agreements or other joint venture/development arrangements with Canadian firms. The multi-talented consortium members can undertake the total manufacture and support of complex systems and products for both domestic and export markets.

The single point contact with the consortium provides customers with a link to several business concerns thus enabling prime contractors to discharge industrial benefit (IB) obligations efficiently and effectively.

Typical of the products and systems that the consortium is capable of manufacturing include military and commercial aircraft; navigational systems; communications systems; radar systems; air, ground, and ship-board antenna systems; control systems; electronic processing systems; and surveillance systems.

Members companies of the consortium have established quality assurance programs which meet AWAP-1, AQAP-4, MIL-Q-9858A, MIL-I-45208A, plus numerous customer-invoked standards.

Shock, vibration, environmental, and functional testing is undertaken in special facilities owned by member companies.

Member companies of the consortium are export oriented and are fully conversant with the intricacies of working on major programs and the management of large contracts.

AVERAGE WORK FORCE: Technical - 100
Production - 200
Others - 50

GROSS SALES: 1989 - \$40M

PLANT SIZE: 150,000 sq ft

EQUIPMENT: Wide variety of numerical controlled (NC) and computer numerical controlled (CNC) machining centers and lathes, drill presses, milling machines, electronic assembly and test equipment, material handling equipment, fiberglass filament winding machinery, computer aided design (CAD) and computer aided manufacturing (CAM) facilities, thermal and vibration electronic components test facility, and desk top publishing equipment.

EXPERIENCE. Present customers of the member companies include various departments in the Canadian and US Governments and industries in Canada, the US, and the international marketplace.

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AÉROTECH INTERNATIONAL Inc

ADDRESS: 100 Eagle Drive
Winnipeg, Manitoba
Canada R2R 1V5

CONTACT: Mr Paul R Sigurdson, President
Tel: (204) 633-1999
Fax: (204) 694-1612

KEYWORDS. Aircraft Heating, Heating (Aircraft), Portable Heaters, AGE.

HISTORY. Aerotech International Inc is a privately Canadian-owned, Winnipeg-based manufacturer and supplier of portable heaters and other ground support equipment for the aerospace industry.

CAPABILITY. Aerotech International Inc supplies and manufactures portable heaters and ducting and aerospace ground support equipment for commercial as well as defence applications.

The company offers a comprehensive line of heaters specializing in the BT400 series. The lightweight (250 kg), portable heaters withstand temperatures to -54 Celsius (-65 °F) and provide instant heat output to 400,000 BTU per hour. The heater is designed to burn gasoline or diesel fuel and operate as a totally self-contained unit, or as a slave-type heater using an electric motor power package.

The company also manufactures its own line of canvas ducting. It also supplies spare parts for all series BT400 heaters and other ground support equipment.

AVERAGE WORK FORCE: Total - 45

GROSS SALES: 1988 - \$4.5M
1989 - \$4.9M

PLANT SIZE: 38,000 sq ft (on 8 acres)

EXPERIENCE. Aerotech International Inc's customer list includes the Departments of Defence in the governments of Canada, the US, the UK, Italy, Turkey, and Australia. Customers also include most major airlines including Air Canada, Canadian International, United Airlines, Northwest Airlines, Finnair, Korean Air, Federal Express, and numerous regional and national carriers. Major oil and mining companies such as Gulf, Esso, Pan Canadian, Dome Petroleum, and Nova round out an impressive customer list.

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AIRCRAFT APPLIANCES AND EQUIPMENT Ltd

ADDRESS: 150 East Drive
Bramalea, Ontario
Canada L6T 1C1

CONTACT: Mr W J White, President
Tel: (416) 791-1666
Fax: (416) 791-7218

KEYWORDS. Coalescing Filters, Distribution (Aircraft Parts), Filters, Fuel Filters; R&O (Aircraft Components); R&O (Avionics); R&O (Ground Power); Separators (Oily Water); Valves; Dehydrators; Demineralizers; Components (Machined); Tachometer Generators.

HISTORY. Aircraft Appliances and Equipment Limited (AAE) was founded in 1949 and was incorporated (Ontario Chapter) the same year. The principal operation of the company at first was the repair and overhaul of aircraft accessories and the distribution of US-built aircraft electrical product accessories in Canada.

AAE commenced their design and manufacturing of fuel filters and coalescers in the year 1959. In 1966, they commenced to design and manufacture aircraft tachometer generators, and this was followed in 1973 by the design and manufacture of ground power AC/DC generators and generator sets. The principal market for AAE services and their products covered all aircraft manufacturers in Canada and US; military requirements, which include US and Canadian Navy requirements; commercial ship builders; etc. AAE is a privately-owned, Canadian company.

CAPABILITY Presently AAE operates three basic divisions

- Repair and Overhaul and Service Division (R&O) - For over 40 years, this division has been overhauling military and commercial components and products produced by leading

manufacturers in the US and Canada. Some of the products handled by this division are automatic flight controls, aircraft controls, electrical power sensing devices, ground power units, motor generators, test stands, search lights, relays, gyros, inverters, etc. This division is also capable of rewinding AC and DC air or oil-cooled generators and stators. It has manufacturing and design capabilities for various power and test equipment for aircraft support.

- Fluid Power Division (FP) - This division is involved in design and manufacturing of a wide variety of filtration equipment. It has now over 32 years of research and development in filtration and coalescing equipment (water separators). The major filtration systems are being supplied to all US-built frigates, cruisers, and destroyers, as well as Canadian frigates. The division also manufactures a wide selection of tachometer generators and valves.

- Technical Sales and Service Division (TSSD) - This division is stocking distributor for other manufactured products. It has catered to the Canadian aerospace industry now for over 34 years. It has distribution rights for aircraft electrical, avionics, and fuel accessories produced by world-leading manufacturers of quality aerospace products. Products distributed include heading reference units, land navigation, muzzle velocity radar, radar antenna, display and transceivers, fuel booster, and lube and scavenge pumps. It also has a supply of RFI/EMI filters. For industrial application, it handles ground air conditioning systems for commercial and military aircraft and a line of self-lubricating bearings. It also represents Cortec Corporation, which produces a wide variety of anti-corrosion products for all types of rust-inhibiting applications

AVERAGE WORK FORCE: Engineers - 12
Engineering Technicians - 18
Others - 90

GROSS SALES: 1988 - \$19.0M
1987 - \$23.0M

PLANT SIZE: 80,000 sq ft

EQUIPMENT. AAE is fully equipped with avionics and flight control test equipment, various electrical test stands, hydraulic and coalescing test stands (including Skydrol), and an in-house Qantel computer system.

EXPERIENCE: AAE has over 40 years of experience in R&O and product distribution/marketing catering to Canadian and US government agencies and the commercial aerospace industry; e.g., deHavilland, Canadair, Beech, Cessna, Piper, and the airlines. Fluid Power Division has catered for over 22 years with their filters and coalescing equipment to major US ship builders; e.g., Ingalls Shipyards, Bath Iron Works, Todd Shipyards, etc. It has also exported its equipment to Spain, Australia, commercial marine companies, etc. In Canada, they supply their equipment to DDH 280 and new Canadian built patrol frigates

REVISED: Mar 90

AIT ADVANCED INFORMATION TECHNOLOGIES

ADDRESS: AIT Building
9 Auriga Drive
Nepean, Ontario
Canada K2E 7T9

CONTACT: Mr Don McKinnon, Vice President and General Manager Systems Division
Tel: (613) 226-7800
Fax: (613) 226-3066

KEYWORDS: Optical Character Recognition; Data Acquisition; Data Processing; Systems Analysis; Network Management Systems; Atmospheric Monitoring; Satellite Subsystems; Radar Systems Analysis; ATC; Vehicle Training Simulators; Secure Identity Documents; Radar Signature Analysis; Expert Systems; Remote Sensing; Space Mission Planning; Program Management; Systems Integration.

HISTORY AIT Advanced Information Technologies Corporation is a Canadian-owned, electronic systems company founded in 1986. It was formerly known as Hitech Canada Ltd, founded in 1973 as an Ottawa-based, computer hardware and software consulting firm.

CAPABILITY AIT Corporation Products Division is primarily involved in the design and manufacture of security document issuance and inspection systems based upon optical character recognition technologies. Their machine readable passport systems are in use by government agencies in Canada, the US, Australia, the UK, and Finland. They also design and manufacture word counters for translation bureau billing and typescript page readers.

AIT Corporation Systems Division is involved in civilian and military radar systems clutter analyses and simulation studies, and is the prime contractor for development of a Wind-Imaging Interferometer (WINDII) which will remotely sense the temperature and velocity of selected ionic species in the upper atmosphere from its station aboard NASA's Upper Atmosphere Research Satellite (UARS) in the early 1990s. Their network management system is used by all Canadian telephone operating companies and their major clients to monitor and maintain public data communications facilities from coast-to-coast. They are developing an expert correspondence entry and filing system.

Their capabilities cover systems analysis; electrical, mechanical, and optical engineering; software design and development, systems project management; systems integration and verification, product assurance (including reliability and maintainability analysis); production; quality assurance, documentation, training, installation, and service

AVERAGE WORK FORCE: PhD - 5
Engineers - 61
Others - 52

GROSS SALES: 1988 - \$13.5M
1989 - \$12.2M

PLANT SIZE: 30,000 sq ft

EQUIPMENT In-house computer systems include Apollo3500 and 4500; Sun 386i, Apple Macintosh, DEC PDP, an Intel 80386 PC, variants of the IBM PC/AT, and Personal System/2 Model 30s and Model 60s.

EXPERIENCE: AIT's present foreign customers include Computer Sciences Corp for the US Immigration & Naturalization Service, the Bank of Finland Security Printing House, and Software Sciences Ltd of England for the UK home office. Present domestic customers include the Canadian Federal Government Departments of Communications, External Affairs, National Defence, National Research Council (Space Research), and Transport (Air Traffic Control and Coast Guard).

REVISED: Mar 90

ALCAN INTERNATIONAL Ltd (Kingston R&D Centre)

ADDRESS: PO Box 8400
945 Princess Street
Kingston, Ontario
Canada K7L 4Z4

CONTACT: Dr David M Moore, Director of Technology
Tel: (613) 541-2167
Fax: (613) 541-2232

KEYWORDS: Aluminum; Materials; Composite Components; Ceramics; Structures; Testing (Materials); Aluminum-Lithium.

HISTORY: Alcan International Ltd is the technology arm of its parent company, Montreal-based Alcan Aluminium Ltd. Incorporated in 1902, Alcan Aluminium Ltd is an integrated aluminum company, engaged worldwide in all phases of the aluminum business including bauxite mining, alumina refining, aluminum smelting, semi-fabrication, and finished product manufacture and sales. Alcan is the largest aluminum company in the world, as well as being one of the largest multinational companies

based in Canada. Alcan Aluminium Corp is the US subsidiary operating numerous plants in various states.

CAPABILITY. Alcan International Ltd is responsible for four R&D centers (two in Canada, one in the US, and one in the UK). The Kingston Research and Development Centre (KRDC) is involved in research and development associated with most aspects of aluminum fabrication processes and products in support of the existing mainstream businesses, as well, considerable effort is being devoted to developing new processes and products in the areas of metal matrix composites, shape casting, packaging, building products, and the environment.

KRDC is especially well equipped with a full range of equipment for microstructural, mechanical property, and surface analytical evaluations. It also has the capability to set up pilot-scale manufacturing of new processes and products. It is recognized as one of the leading materials laboratories in Canada.

AVERAGE WORK FORCE. Investigators - 93
Technologists - 119
Management and Support - 48

GROSS SALES: (Alcan Aluminium Ltd)
1988 - \$8.3B
1989 - \$8.6B

PLANT SIZE. (KRDC) - 220,000 sq ft

EQUIPMENT. Electron Optics (STEM, SEM, EPMA), surface analysis (XPS, SAM, FTIR); optically metallography; mechanical property (tensile, fracture toughness, fatigue, etc.); corrosion testing, coating and finishing (organic, anodizing, sputtering); aluminum foundry; aluminum rolling and extrusion; machine shop; chemical analysis (ICP and OES); non-destructive testing (X-ray, ultrasonic, thermographic); structural test bed; ceramics manufacture; and can and heat exchanger manufacturing test lines.

EXPERIENCE: Present clients for the most part are the various operating companies of Alcan worldwide. Support is also provided for start-up businesses under Alcan ownership, such as Alupower (Al-air batteries) and Duralcan (Al-Si MMCs).

REVISED: Mar 90

AMHERST AEROSPACE INC

ADDRESS: PO Box 10
Amherst, Nova Scotia
Canada B4H 3Y7

CONTACT: Mr Greg Wilson, Vice President Operations
Tel: (902) 667-3315
Fax: (902) 667-1047

KEYWORDS: Airframe Components; Bonded Components (Composite); Bonded Components (Metal); Components (Aircraft); Machining; R&O (Aircraft Components).

HISTORY: Amherst Aerospace Inc is a high-technology, aircraft component manufacturing, repair, and overhaul facility founded in 1952 by Enamel & Heating Products Ltd of Sackville, New Brunswick, Canada. It was originally owned by Rhodes & Curry Ltd, an Amherst-based company, who sold it to Canadian Car & Foundry Ltd of Montreal, Quebec. Enamel & Heating Products Ltd changed its name to Enheat Ltd in 1972, to Enheat Inc in 1980, and to Amherst Aerospace Ltd in 1989.

CAPABILITY: Amherst Aerospace is a high-technology, aircraft component manufacturing and repair and overhaul facility.

AVERAGE WORK FORCE: Engineers - 9
Production - 238
Quality Control - 22
Others - 54

GROSS SALES: \$17M-18M average

PLANT SIZE: 120,000 sq ft (Manufacturing)

EQUIPMENT: Amherst Aerospace Inc employs the following equipment: autoclave, drying ovens, temperature-controlled lay-up room, process room, paint shop, brakes, presses, routers, rolls, shears, drop hammers, stretch forming machines, lathes, millers, planers, jig borers and grinders, dimplers, miscellaneous small hand tools, and processing tanks for phosphoric acid anodizing.

EXPERIENCE: Amherst Aerospace has 38 years of experience with major aircraft companies of North America. Present customers include Canadian Department of National Defense, Boeing Airplane Co, Lockheed California Co, McDonnell Douglas Aircraft Co, Grumman Aerospace Co, Fleet Industries Ltd, The deHavilland Aircraft of Canada Ltd, and Canadair Ltd.

REVISED: Mar 90

AMPTECH Corp

ADDRESS: 3202 12 Avenue NE
Calgary, Alberta
Canada T2A 6N8

CONTACT: Mr Malcolm Smith, Marketing Manager
Tel: (403) 221-0550
Fax: (403) 273-5528

KEYWORDS: Plastic Injection Molding; Tool Making (Aluminum/Zinc); Die Casting (Aluminum/Zinc)

HISTORY: Amptech Corporation is a Canadian-owned company founded in Calgary in 1967. The company operates out of two buildings, both located in Calgary.

CAPABILITY: Amptech Corporation is capable of high-precision, custom, injection molding and aluminum and zinc die casting. To complement both processes, Amptech has an extensive in-house tool and die making facility.

AVERAGE WORK FORCE: Manufacturing – 130
Design and Engineering – 8 (4 P Eng)
Quality Control – 12
Office – 12

GROSS SALES: 1988 – \$7.5M
1989 – \$10.8M

PLANT SIZE: Plant 1 – 58,000 sq ft
Plant 2 – 24,000 sq ft

EQUIPMENT: Twenty-five plastic injection molding machines ranging from 5 to 715 ton; 2 aluminum/zinc diecasting machines ranging from 250 to 350 tons; 2 automatic zinc machines; full range of testing equipment; MacDonnell Douglas Unigraphics II CAD/CAM system; 2 CNC vertical machining centers; various milling machines, grinders, EDM machines, lathes, and presses.

EXPERIENCE: Present customers include Bristol Aerospace, Olin Corporation (General Defence Corporation), Automated Machine Product, and Valentec Olivette.

REVISED: Apr 90

THE AMTEK GROUP

ADDRESS: 9 Slack Road
Nepean, Ontario
Canada K2G 0B7

CONTACT: Mr T R Canning, Senior Vice President and General Manager
Tel: (613) 727-5040
Fax: (613) 727-1262

KEYWORDS: Automatic Test Equipment, Configuration Management, Contract Management; ILS; Level of Repair Analysis; Logistic Support Analysis, Program Management, Training.

HISTORY: AMTEK was formed in January 1981 to provide services to government and industry in Integrated Logistic Support (ILS), Automatic Test Equipment (ATE), and contract/program/proposal management.

CAPABILITY: The AMTEK Group consists of two wholly Canadian-owned companies engaged in various fields of support to the government and industry defence sectors (principally aerospace).

- AMTEK Management Inc
- AMTEK Testware Ltd

AMTEK Management Inc (AMI) provides professional engineering and management services to both government and industry. The company specializes in the application of advanced management techniques in the fields of Integrated Logistics Support (ILS) and project/proposal management. Services offered include:

- Full range of ILS Services
- Proposal Preparation and Assistance
- Program and Procurement Management
- Configuration Management
- Technical Publications
- Training
- Data Management Systems
- Logistics Support Analysis
- Life Cycle Support Management

AMTEK Testware (ATL) is based in Edmonton, Alberta and provides engineering services in automatic test equipment (ATE) and test software development. ATL also provides professional systems integration and engineering services.

AVERAGE WORK FORCE: 100 (Professional Engineers, Technologists and support staff)

GROSS SALES: 1988 – \$3.5M
1989 – \$4.1M

PLANT SIZE: 32,000 sq ft (AMI)
18,000 sq ft (ATL)

EQUIPMENT: DEC/VAX, IBM, HP, COMPAC, CAD.

EXPERIENCE: AMTEK's clientele includes the Department of National Defence, Department of Supply and Services, Canadian Marconi, Bristol Aerospace, Hughes Aircraft, British Aerospace, Paramax, Oerlikon Aerospace, Bendix Avelex, European Helicopter Industries, Vickers Shipbuilding and Engineering Ltd, Frontec, Canadair, and NRC.

REVISED: Mar 90

ANACHEMIA CANADA Inc

ADDRESS: Plant
500 – 2nd Avenue
Ville St-Pierre
Montreal, Quebec
Canada H8R 1M3

Mail
PO Box 147
Lachine, Quebec
Canada H8S 4A7

CONTACT: Mr Guy R Quenneville, Contract Manager
Tel: (514) 489-5711
Fax: (514) 363-5281

KEYWORDS: Chemical Warfare Defense Equipment, Paper (Chemical Agent Detector); Chemical Agent Detector Kits, Nerve Agent Vapor Detector; Chemical Agent Liquid Simulator Airburst; Laboratory Chemicals; Detector (Chemical Agents).

HISTORY Anachemia Canada Inc has been in operation for more than 50 years and is a wholly-owned, Canadian company located in Montreal, Canada. For more than 20 years Anachemia has been producing chemical warfare detection devices. The company has a subsidiary in Rouses Point.

CAPABILITY Anachemia is primarily involved in the manufacture of laboratory chemicals and chemical warfare detection devices. Its 20 years of experience in producing detection devices and the superior quality of its products, together with a record of better than 95% on-time delivery performance, is the reason that Anachemia Canada Inc is the prime supplier of these products to virtually all Western Alliance Countries.

AVERAGE WORK FORCE: PhD - 4
Engs - 3
Others - 200

GROSS SALES: 1988 - \$15.0M
1989 - \$18.0M

PLANT SIZE: 90,000 sq ft

EQUIPMENT In-house computer system includes VAX and IBM

EXPERIENCE Present customers include the Department of National Defence in the Canadian Government, the United States Army (the company is the only supplier of Paper Chemical Agent Detector M9 and M8), and the departments of defense of all NATO countries.

REVISED: Mar 90

ANDREW CANADA INC

ADDRESS: 606 Beech Street
Whitby, Ontario
Canada L1N 5S2

CONTACT: Mr John Giraudy, Business Development Manager,
Government Products Group
Tel: (416) 668-3348
Fax: (416) 668-8590

KEYWORDS: Antennas; ATC; Radar Weather; Radar Navigation Aids; Tactical Communications; Earth Stations; Terrestrial Microwave Antennas; Special Purpose Antennas, HF Antennas, Broadcast Antennas, Fabricated Aluminum Structures; HELIAX Coaxial Cable; Elliptical Waveguides; Waveguide; Towers (Antenna); Equipment Shelters; Build-to-Print; Antenna Design & Testing.

HISTORY Andrew Canada Inc was incorporated in 1953 being granted a Dominion Charter by the Government of Canada, and is a subsidiary of Andrew Corporation of Chicago, IL. Andrew has grown and expanded with the dynamic communications industry. The design and manufacturing efforts of the company have been centered on antennas (earth stations, terrestrial microwave, radar and navaid), transmission lines (waveguides and coaxial cables), and related equipment. Through the years, Andrew engineers have paced the industry in these specialties. From its first directional broadcast arrays to its current satellite earth station antennas, Andrew has grown in physical size and technical knowledge.

CAPABILITY Andrew can supply all of the elements for microwave, broadcast, earth station, VHF, UHF, HF, cellular, special application, military, and tactical antenna systems including antennas, waveguide and cable, towers, equipment shelters, transportation, installation, and project management. The company has also developed a wide variety of custom antenna systems for applications as varied as radar, navigation aids, telemetry, command and control, and tactical HF communications, in frequencies ranging from VLF to millimeter wave.

AVERAGE WORK FORCE: PhD - 2
Engineers - 20
Others - 250

GROSS SALES: 1988 - \$34.5M
1989 - \$43.0M

PLANT SIZE: 8,036 sq meters

EQUIPMENT. The Canadian operation includes metal spinning, punching, forming, an extensive machine shop with a number of automatic machine tools, a welding shop with equipment for tungsten/inert gas, silver brazing and soldering, complete facilities for metal finishing and painting, assembly and fitting shops, and packing facilities. Andrew uses an on-line Manufacturing and Production Information Control System, commercially available structural analysis software, including FAPMAT (an interactive program which interprets windloadir.g), and RMSDISP (a post processor program which manipulates ASAS displacements to interpret antenna performance). The company's facilities include a fully equipped model shop, a 19-meter near field anechoic chamber and an antenna pattern test range with unobstructed sources, ranging from 200 to over 5,000 meters from the main test tower.

EXPERIENCE: Andrew's present customers include military and government agencies as well as prime contractors in Canada, the US, and abroad. Recent contract awards include the manufacture of 23-foot reflector antennas, feed systems, and waveguide for the Next Generation Weather Radar (NEXRAD) system to determine wind speed, wind direction and storm configurations. Raytheon Co, under the contract to the Electronic Systems Division of the USAF, awarded Andrew a contract for the manufacture of dual-space diversity 9.5 ft parabolic antennas and waveguide feeds for AN/TRC-170 (V2) tactical digital troposcatter equipment. Raytheon Co has also awarded Andrew a contract for the production of 35-ft L-Band antennas for the Radar Modernization Program (RAMP) to replace and modernize ATC primary and secondary en route and terminal radar systems. The company is manufacturing 98 earth station antennas for CANAC/Microtel to be used in the North Warning System. Andrew is also producing munitions lockers and launchers for the Plessey Shield II Chaff and IR Decoy System being sold by Plessey Naval Systems to the Brazilian Navy, the Canadian Patrol Frigate Program and the Tribal Class Update and Modernization Project (TRUMP) and pedestals for the Fire Director Radar on the US Navy's AEGIS ship program.

REVISED: Mar 90

APPLIED MICROELECTRONICS

ADDRESS: 1046 Barrington Street
Halifax, Nova Scotia
Canada B3H 2R1

CONTACT: Mr V Murray Vandewater, Vice President Operations
Tel: (902) 421-1250
Fax: (902) 429-9983

KEYWORDS: Electronics; Electronic Systems; Real-time Software; System Development, Multi-tasking, System Integration, Controllers, Microprocessors, Programmable Devices, VLSA, ASIC, CAD, CAE, Cable Television, Fiber Optics, Simulation, High Speed Communication, Hardware Architecture, Control Systems, Graphics Development.

HISTORY. Applied Microelectronics is a Canadian company founded in 1981. The founding partners were originally the Technical University of Nova Scotia, Dalhousie University, and the Nova Scotia Research Foundation Corporation. The company is an independent enterprise with its own facility, resources, and management.

CAPABILITY. Applied Microelectronics is primarily involved with the development of complex multi-tasking systems for applications such as image and digital signal processing systems. The company also develops electronics systems (e.g., microcontrollers, telemetry systems, specialized consumer products) which are manufactured in volume. Services involve the total development including specification, design, preproduction prototypes and manufacturing support through the products' life.

AVERAGE WORK FORCE: PhD - 3
Hardware Designers - 9
Software Designers - 5
Technicians/Programmers - 9
Others - 5

GROSS SALES: 1988 - \$1.2M
1989 - \$1.5M

PLANT SIZE: 12,000 sq ft

EQUIPMENT: Extensive networked computers and design stations with high-performance, computer aided engineering tools for simulation, printed circuit board layout, and semicustom integrated circuit design. There are also extensive test and measurements equipment and software development tools.

EXPERIENCE: Present customers include large and small companies in Canada and the United States. There is also some work in advanced military research.

REVISED: Mar 90

APPLIED MICROSYSTEMS Ltd

ADDRESS: 2035 Mills Road
Sidney, British Columbia
Canada V8L 3S1

CONTACT: Mr Steve McBeath, Sales and Marketing
Tel: (604) 656-0771
Fax: (604) 655-3655

KEYWORDS: Conductivity Sensors, Current Meter Systems, Data Acquisition, Data Logging, Depth Systems, Geophysical Instrumentation, Meteorological Instruments, Oceanographic Instrumentation, Sound Velocity Systems, Temperature Sensors, Underwater Acoustics, Underwater Instrumentation, Water Quality Measurement

HISTORY: Applied Microsystems Ltd is a Canadian-owned, high-technology manufacturing company, incorporated in British Columbia in 1974. It specializes in the manufacturing of high-technology sensors and data-logging instrumentation.

CAPABILITY: Applied Microsystems' primary business is design and manufacture of standard and custom electronic instruments for use underwater. The products are reliable, high-precision, data-recording instruments built for long-term deployment based on battery power. The company designs and manufactures its own sensors, electronics, and pressure housings, and is well known for its oceanographic engineering and customized products. Approximately 33% of its sales are in Canada, 33% in the US, and 33% throughout the remainder of the world. Although a number of products are sold directly by the factory, the company is represented in most countries through an agency structure. In the US, agents in Florida, Texas, Massachusetts, California, and Virginia represent all of the standard products manufactured by Applied Microsystems Ltd.

AVERAGE WORK FORCE: Engineers - 4
Others - 12

GROSS SALES: 1988 - \$430K
1989 - \$560K

PLANT SIZE: 5,060 sq ft

EQUIPMENT: Applied Microsystems has machine shop facilities, an electronics assembly and production facility, a research and development division, an environmental test chamber, a deep ocean testing, and a sea water test tank.

EXPERIENCE: Past customers include nearly every oceanographic and hydrographic government research institution around the world.

REVISED: Mar 90

APREL Inc

ADDRESS: Suite 500
38 Antares Drive
Nepean, Ontario
Canada K2E 7V2

CONTACT: Dr Jacek J Wojcik, PEng, President
Tel: (613) 727-0334
Fax: (613) 723-1657

KEYWORDS: Certification Testing, Environmental Testing, Electromagnetic Compatibility, EMI, Testing (Certification), Acoustic Testing, Engineering Sciences, Specifications Preparation, Shielding Consulting & Research.

HISTORY: APREL Inc (Advanced Products Research and Engineering Laboratories) is a privately owned, independent, Canadian, commercial laboratory which provides confidential certification testing, applied research and development, and engineering and related services to a wide range of government departments and agencies and major corporations in the telecommunications, military, and computer industries. APREL Inc was incorporated on 2 Nov 1982 under the name Aprel Industrial Acoustics Ltd. With a broadening in the scope of activities, the name of the company was changed to APREL Inc in July 1985. APREL is located 5 minutes from Ottawa International Airport and 45 minutes from the New York state border in prestigious Rideau Heights Business Development Park.

CAPABILITY: APREL Inc is the most advanced independent certification testing, R&D laboratory in Canada featuring a large floating anechoic chamber, open area test site, two shielded rooms, various environmental test facilities, and electronic and acoustic labs. APREL Inc is involved in the testing of telecommunications equipment, computers, and military equipment for Department of Communications, Federal Communications Commission, Canadian Standards Association, Military and Industrial Standards. APREL Inc also actively participates in the development of national and international standards. APREL's scope of activities and capabilities encompass electromagnetic interference/compatibility; electrostatic discharge (simulated lightning), DOC, FCC, JATE, and CSA certification, voice and data terminal performance, electroacoustics and acoustics, reliability and environmental engineering, product engineering and re-engineering, product design and manufacture, independent R&D contracting; and marketing capability.

Services offered by APREL include contract research and engineering services, development of product/user specifications including performance and quality criteria, test plans and reports, quality programs, after-market engineering, pre-market development and product integrity (including regulatory compliance), as well as other specialized services tailored to the requirements of APREL's clients.

AVERAGE WORK FORCE: Engineers & Scientific Staff - 20

GROSS SALES: No data.

PLANT SIZE: 21,000 sq ft

EQUIPMENT: See discussion under **CAPABILITY** above.

EXPERIENCE: APREL Inc has provided confidential services to a wide range of organizations in the telecommunications, computer, electronics, and high-technology fields. APREL's primary area of business falls within the communications sector and covers both civilian and military applications. Since its inception, the firm has carried out over 1000 projects for over 200 clients, some of whom include the Canadian Department of National Defence, the Department of Transportation, Department of Communications, Health and Welfare Canada, the Royal Canadian Mounted Police, ComDev, Leigh Instruments, Honeywell, Bull, Raytheon, Canadian Marconi Corporation, Northern Telecom, Bell Canada AT&T, and NovAtel.

REVISED: May 90

THE ARMSTRONG MONITORING CORP

ADDRESS: 215 Colonnade Rd South
Nepean, Ontario
Canada K2E 7K3

CONTACT: Mr James Bowen, Sales/Marketing Department Manager
Tel: (613) 225-9531
Fax: (613) 225-6965

KEYWORDS. Calibration Equipment, Carbon Monoxide Gas Detection, Catalytic Sensors, Chemistry, Chlorine Gas Detection, Combustible Gas Monitors, Data Acquisition, Electrochemical Devices, Electronic Gas Detectors, Environment, Gas Detectors, Hazardous Gas Detection, Hydrogen Sulfide Sensors, Leak Detectors, Monitors (Gas), Pollution Monitoring Equipment, R&O (Enviro-nics), Safety Equipment, Sensors, Solid State Devices, Thermal Conductivity Devices, Toxic Gas Detectors.

HISTORY. The Armstrong Monitoring Corp is a Canadian owned electronic hazardous gas and vapor detection systems manufacturing firm founded in January 1981. The company has offices across Canada, throughout the Pacific Rim and the US.

CAPABILITY. The Armstrong Monitoring Corp is primarily involved in the manufacturing of fixed and portable hazardous gas detection systems, in addition to vapor detection for the petroleum industries fuel storage facilities. In the fixed gas detection, they offer both rack and wall mount systems incorporating a remote calibration sensor/transmitter that produces a time saving factor. In the area of sensors, they range from electrochemical, catalytic and solid state. Offered in the solid state type is a specific poison proof H₂S sensor with a five year warranty and a ten year life expectancy. On the portable side, units range from hand-held AMC 1100 series to the AMC 3000 series. In the AMC 3000, AMC offers their exclusive three meter, three sensor concept in a compact portable unit which allows three separate conditions to be monitored simultaneously (oxygen, toxic, and combustible gases).

The other major product line developed for the petro-chemical industry is the AMC vapor detection system. A solid-state poison proof sensor specific to petroleum distillates such as gasoline, yet not responsive to ground methane (CH₄), is used in conjunction with a wide range of monitors. These monitors are packaged as single channel or four to twelve channel units. The vapor system offers the owners of petroleum storage facilities both underground and above ground twenty-four hour surveillance of their tanks, in the event that leakage should occur.

AMC's human resources permits comprehensive maintenance of all levels of manufacturing from in-house R&D (consisting of engineering staff and product technician), to Quality Control, Quality Assurance, right through to their training programs.

AVERAGE WORK FORCE. Engineers - 4
Degrees - 7
Others - 25

GROSS SALES: No data.

PLANT SIZE: 14,000 sq ft

EQUIPMENT: Calibration chambers, environmental chamber (1 ton), Litton 8820 computers, full line of instrumentation devices for alignment and testing capability, 210 unit TRX 12 volt power burn-in panel, 4 unit 115 volt monitor burn in panel, and a 600 volt transformer power supply.

EXPERIENCE. Customers countries include Canada, the US, South America, Singapore, Malaysia, India, the Netherlands, Australia, Thailand and Taiwan. Applications range from heavy water plants (H₂S), coal mining (CH₄), pulp and paper industry (H₂S, CO), offshore rigs (H₂S, CH₄), commercial properties (CO), underground vehicle tunnels (NO₂, CO), to marine and navy ships (CH₄), and now petroleum storage facilities (gasoline), plus many other institutions throughout the world.

REVISED: Mar 90

ARRAY SYSTEMS COMPUTING Inc

ADDRESS: Suite 200
5000 Dufferin Street
Downsview, Ontario
Canada M3H 5T5

CONTACT: Ms Linda M Davis, Business Development
Tel: (416) 736-0900
Fax: (416) 736-4715

KEYWORDS. Data Acquisition, Data Processing, Meteorological Satellite Ground Stations, Signal Processing, Image Processing, Computer Vision, Neural Networks, System Integration, Ada Programming, Synthetic Aperture Radar, Satellite Aided Search and Rescue, Software Maintenance, Radar Weather Stations, Automated Real-Time Detection, Systems Analysis, Feasibility and Requirement Studies.

HISTORY: Array Systems Computing, Inc (ASC) is a private, Canadian-owned, high technology, software development firm, incorporated in 1981.

CAPABILITY. Array focuses on the development of software and integration of real-time signal/image processing systems. Included are weather satellite data collection and image dissemination systems, unusual high-speed real-time data acquisition systems, large on-line data-based systems, complex radar systems, Ada programming and compiler, automated detection systems, simulation studies and specialized scientific programming. ASC has installed several meteorological satellite ground stations including two for Environment Canada in Edmonton and Toronto and one for the Radio Research Laboratory in Seoul, Korea. Recently ASD developed an automated weapon detection system for airport security for Transport Canada, and an Expert Debugging Software Assistant for Ada which will facilitate IV&V. ASC's capabilities cover the broad areas of system and software design and development, systems management, feasibility analysis, systems integration, quality assurance and configuration management, documentation, installation, testing, and training.

AVERAGE WORK FORCE. PhD - 4
Computer Scientists and
Engineers - 15
Other - 5

GROSS SALES: 1988 - \$1.7M
1989 - \$1.7M

PLANT SIZE: 4,500 sq ft

EQUIPMENT. In-house computer systems include VAX, SUN Concurrent, IBM, Perkin-Elmer, and NCR Tower.

EXPERIENCE. Customers include Canadian Department of National Defence (DCIEM, DREA, DREO), Environment Canada (Atmospheric Environment Service), Transport Canada, Canadian Centre for Remote Sensing, Canadian Forestry Service, Metropolitan Toronto Department of Roads and Traffic, Motorola Information Systems Ltd, Ontario Hydro, Phillips Petroleum, Spar Aerospace Ltd, TRW Inc, US Department of Defense, and General Instrument of Canada Ltd.

REVISED: Mar 90

ATLANTIS AEROSPACE Corp

ADDRESS: 1 Kenview Blvd
Brampton, Ontario
Canada L6T 5E6

CONTACT Mr Chris Lehman, Marketing Manager, Aircraft Programs
Tel: (416) 792-1981
Fax: (416) 792-7251

KEYWORDS: Animated System Trainers; Avionics; Computers; Engine Component Simulator, Radio/Radar Altimeters, Simulators, Software Development; Software Services; Systems Simulation; Test Equipment (Digital 1553); Testing/Test Equipment; Training Aids; Training Simulators; Electro-optics, Maintenance Simulators; Operator Simulators; Video Training (Thru-Site) Systems.

HISTORY: Atlantis Aerospace is a wholly owned Canadian company incorporated in 1978. Atlantis Flight Research Inc is a subsidiary, functioning as the R&D arm of the company.

CAPABILITY: Atlantis manufactures simulators/computer assisted training systems, avionics test equipment and specialized aerospace instrumentation and control systems.

Atlantis Aerospace Corp has firmly established itself in the international military and commercial marketplace with an excellent reputation for quality and performance.

The Simulation/Training Group offers total training systems capability that spans the complete range of training aids including: maintenance trainers, part task trainers, operational trainers, computer based training systems and hardware-in-the-loop trainers.

Atlantis has produced simulator systems for use by the US, Australian and Canadian Forces which include a complete suite of maintenance trainers for the F/A-18 aircraft, the H-46 helicopter and the E-6 aircraft. Each of these systems offers "O-level" maintenance training, and features free-play systems simulation, interactive laser video disk technology, mathematically modelled test equipment and instructor selected faults. Current programs include a suite of F-15E aircraft maintenance trainers (AMTs) for the USAF and several CW and naval operations trainers for the Canadian Armed Forces.

The Avionics Test Equipment Group offers a complete line of commercial and military avionics support equipment including a full range of ARINC testers designed to support the new digital commercial aircraft such as the Boeing 757/767 MIL-STD-1553/A bus testing capability is provided by the DCM-1553 Digital Bus Communicator. Designed as a user-friendly interface to the digital busses of aircraft such as the F/A-18, the DCM-1553 has been ordered by the US, Australian, and Canadian Air Forces.

The Instrumentation/Control Group specializes in developing custom microprocessor-based technology such as Autopilot/Guidance Systems for remotely piloted vehicles and target drones.

AVERAGE WORK FORCE: Engineering - 115
Manufacturing - 35
Others - 40

GROSS SALES: 1986 - \$13M
1987 - \$15M
1989 - \$14M (Est)

PLANT SIZE: 64,000 sq ft plus 20,000 sq ft off-site storage

EXPERIENCE: Atlantis has supplied equipment to the following companies: McDonnell Douglas, the US Air Force, Canadian Department of Defense, Boeing Helicopter Co, Boeing Military Airplane Co, Boeing Aerospace Co, the US Navy and Marine Corps, and the Royal Australian Air Force.

REVISED: Mar 90

ATOMIC ENERGY OF CANADA Ltd

ADDRESS: 344 Slater St
Ottawa, Ontario
Canada K1A 0S4

CONTACT: Dr S R Hatcher, Acting President and CEO
Tel: (613) 237-3270
Fax: (613) 563-9499

KEYWORDS: Nuclear, Testing, Process Control, Optics, Candu, Decommissioning, Electro-Optics, Engineering, Environmental Control, Robotics, Structural Dynamics, Chemical Analysis, Ceramics, Spectrometric Technology, Heat Energy, Steam Quality Stack-Gas Scrubbing.

HISTORY: Atomic Energy of Canada Ltd (AECL) was formed as a crown corporation in 1952 with a mission to develop nuclear energy and associated technologies for the benefit of Canada.

The company has recently redefined its strategic direction and now emphasizes innovation and the development of non-nuclear products and services based on traditional enterprises.

CAPABILITY: AECL research operates two world-class research and development facilities. Chalk River Laboratory at Chalk River, Ontario, and Whiteshell at Pinawa, Manitoba. They represent one of Canada's

top multi-disciplinary teams of technical professionals with expertise in almost every branch of science and engineering including such fields as electronics, computer science, metallurgy, environmental management, design, construction, material physics, thermal hydraulics, wear and inspection, instrumentation, heat transfer, safety, etc.

AECL Candu, located in Mississauga, Ontario, designs, markets, and manages Candu nuclear reactor projects in Canada and internationally.

AVERAGE WORK FORCE Professional experts - 1623
Technical Non-Production - 992
Production - 784
Administrative - 913

GROSS SALES: 1988 - \$193M
1989 - \$190M

PLANT SIZE: 2 World-Class Laboratories (Chalk River, Ontario and Pinawa, Manitoba); Engineering group in Mississauga, Ontario.

EQUIPMENT: Major facilities include research reactors, TASC (Tandem Accelerator Superconducting Cyclotron), drop-test facility, thermal hydraulic loops, hot cells, radioisotope production facility, heavy water upgrading facility, physical security systems, tritium removal facility, computerized tomography equipment, neutron radiography equipment, corrosion testing equipment, fretting-wear test facility, material characterization equipment, fracture and failure analysis equipment, catalyst lifetime test facility, computer aided design facilities, machining, welding and sheet metal facilities, a wide array of research analytical equipment, underground research and storage facility, two-phase flow and gas dynamics equipment, combustion test facility, etc.

EXPERIENCE: Atomic Energy's present customers include the Canadian Government, major electric power utilities, Canadian and international industries, and Canadian and foreign research institutes and associations.

REVISED: Mar 90

(ATS) AERONAUTICAL TRAINING SYSTEMS Inc

ADDRESS: 3163 Harvey
St Hubert, Quebec
Canada J3Y 3T7

CONTACT: Mr John Burke, Director, International Marketing
Tel: (514) 676-6259
Fax: (514) 676-1384

KEYWORDS: ATC; Simulators (ATC); Mobile Control Towers; Digital Recorders; Data Acquisition; RPV, Ground Control Stations; Computer Aided Learning; Ammunition Design and Testing, Aerial Targets; Radar Augmentation Devices; Software Development.

HISTORY: ATS (Aeronautical Training Systems Inc) is a high-technology, aviation services company founded in 1983 as a wholly-owned subsidiary of Ballistech Systems Inc (BSI). BSI is a Canadian-owned, high-technology engineering company, servicing the Canadian Department of National Defence and other NATO Government defense agencies. A US subsidiary is currently being formed in North Troy, Vermont. ATS and BSI are co-located at the above address, and the capabilities described below cover both companies.

CAPABILITY: ATS is primarily involved in the design and manufacture of air traffic control training and operational equipment. Other specialties of the ATS/BSI group includes computer aided learning systems, digital recorders (data acquisition and data processing), high "g" electronics, and instrumentation/field experiment support services. ATS radar environment simulators developed by ATS personnel are presently in service in the Middle East, Africa, Scandinavia, and South America. A mobile ATS control tower designed and fabricated by ATS is in service with Transport Canada (Ontario Region). ATS signal light guns (Aldis Lamps) are in service with Transport Canada, the Canadian Air Force, and other

countries around the world. Digital stand-alone recorders (DIGISTAR) and data acquisition systems developed by ATS have been used at White Sands Missile Range by DND, DOD/DNA, and the Government of Norway. DND and NDCS (Norway) have recently procured DIGISTAR digital recorders. Aerial targets have been sold to Canada, Denmark, Italy, and Germany. The company is currently developing a number of specialized test facilities for DND, including impact testing facilities, an explosive driven blast tube, and proof test gun mounts. General capabilities include ammunition and weapons systems design, ballistic and high explosive testing and test facility development, aerial targets, ATC aviation equipment development support and training, software development, and instrumentation development

AVERAGE WORK FORCE: Technical - 30
Others - 20

GROSS SALES: 1988 - \$2.4M

PLANT SIZE: 7,000 sq ft (St Hubert, Quebec)
2,000 sq ft (Medicine Hat, Alberta)

EQUIPMENT. Silicon graphics personal IRIS and SUN 4/C workstations, IBM AT/PS-2 compatible microprocessors, electronic and mechanical CAD, finite element structural modeling, solid modeling, digital electronics development facilities. The company operates test facilities, including a 1.8m x 50m FAE blast wave tunnel for DND/DRES at Suffield, Alberta, and an underwater explosion testing facility at Bedford, Quebec.

EXPERIENCE. Customers include DND (Canada), DOT (Canada), US Army (BRL), Defense Nuclear Agency (DNA), Government of Norway, Government of West Germany (BWB), ICAO (International Civil Aviation Organization), Danish Navy, Government of Greece (Civil Aviation and Navy).

REVISED: Mar 90

THE AUSTIN COMPANY Ltd

ADDRESS: 304 The East Mall
Suite 701
Etobicoke, Ontario
Canada M9B 6E2

CONTACT: Mr Ralph E Luke, Vice President and General Manager
Tel: (416) 239-4301
Fax: (416) 239-2459

KEYWORDS: Design Services, Consulting Engineers, Computer Aided Design, Aircraft Manufacturing Facilities, Engineering Services, Facilities Design, Hangers, Maintenance & Overhaul Facility, Plan, Master Planning, Tempest Enclosures; EMI-NEMP-EMP Shielding; Project Management; Quality Assurance; Shielded Rooms (RF); System Integration, Feasibility Studies, Engineering and Construction, Anechoic Facilities, Security Systems, Constructors

HISTORY The Austin Company, founded in Cleveland in 1878, and a subsidiary of the National Gypsum Company since 1984, is an international organization providing a comprehensive portfolio of professional consulting, design, engineering, and construction services to help industrial, commercial, and institutional managements solve their physical facility problems. The Austin Company Limited was incorporated in Canada by Federal Charter in 1930, though the Austin Company had built many projects in Canada in previous years. A nucleus operation was established in Montreal, Quebec, in 1956. Due to substantial growth, the Austin Company moved to Toronto, Ontario, in 1965 where they have been located in the 427/Burnhamthorpe/Bloor area ever since. The Austin Company Limited, Canada, is owned by The Austin Company of Cleveland, Ohio, which originated some 110 years ago. The Austin Company operates in Canada and United States through nine district organizations based in principal cities. The Austin Company has international units in four countries: United Kingdom, Spain, The Netherlands, and Australia, with associate companies in Brazil and Italy and coordinating representation in Japan and Mexico.

CAPABILITY. The major focus of The Austin Company is to apply its 110 years of expertise in the development of productive and efficient facilities that contain the highest level of technology available. Austin

resources cover the full range of services required to implement major projects and programs from space programming, planning, feasibility studies, and consulting to complete architectural, interior design, engineering, quality assurance, procurement, and construction. Over 1600 professionals in Austin's operating units are trained in the several disciplines needed to master plan, design, and construct the most sophisticated, state-of-the-art maintenance complexes in the world, with the most cost-effective solutions.

To assist in the effective design and preparation of construction drawings, Austin utilizes advanced CADD systems.

Austin has over 70 years of experience in the design and construction of manufacturing plants for commercial and military fixed wing aircraft, helicopters, and missiles

The Austin Company has possibly planned, designed and/or built more aerospace support facilities than any other free-world firm. They have accomplished successful assignments for over 80 aviation/aerospace clients, most for repeat work, including over 23 million sq ft of facilities for The Boeing Company. This long span of aerospace involvement has provided The Austin Company with the opportunity to participate in the evolving technologies that have become the mode of aerospace development. Composite components, electronics, non destructive testing, autoclaves, paint systems, corrosion control, and large size and weight of aircraft are all conditions that have to be economically accommodated. The Austin Company provides the airline industry a full range of professional consulting, design, engineering, and construction services dedicated to the support of timely maintenance operations in cost effective, high-production facilities.

Austin's services are tailored to meet the specific needs and goals of each client for his particular project. The work to be performed can draw from a vast body of prior experience that has been provided for the following type facilities: aircraft maintenance, corrosion control, wash, strip, and paint facilities; electronic and instrument laboratories; engine overhaul shops, wiring shops, fabrication shops, avionics shops, automated warehouses; metrology laboratories; air frame fabrication; aircraft assembly, design and engineering centers; related aircraft ramps, aprons, taxiways; and portable and fixed docks.

AVERAGE WORK FORCE: Canada - 90
US & International - 2100

GROSS SALES: \$1.0B annually

PLANT SIZE: 14,000 sq ft plus 9 design locations across USA

EQUIPMENT. In-house CAD, CADD printers. CADD system is Microstation, a PC-based integrator compatible CADD system. Latest in Xerox management information system together with computerized accounting.

EXPERIENCE. Austin's client list includes Department of National Defence, Alaska Airlines, Alitalia, The Boeing Company, Eastern Airlines, Federal Express, Hellenic Aerospace Industries, McDonnell Douglas Corporation, Northwest Airlines, Texas International Airlines, United Airlines, US Air Force, Naval Air Rework Facilities (NARF), Department of the Navy (USA), and Northrop.

In addition, the company provides a wide range of architectural, engineering, design, and construction services for a variety of aerospace support industries and other governmental departments.

REVISED: Mar 90

AVIATION PLANNING SERVICES Ltd

ADDRESS: 17th Floor
1 Place Ville Marie
Montreal, Quebec
Canada H3B 2C1

CONTACT Mr K Romi Singh, Executive Vice President
Tel: (514) 878-4388
Fax: (514) 861-6310

KEYWORDS Consulting (Aviation), Master Planning, Traffic Forecast, Economic Analysis, Site Selection, Equipment Procurement, Route Analysis, Maintenance & Overhaul Facility Planning, Market Surveys, Aircraft Performance Analysis, Equipment Selection, Business Plan Preparation, Navigational Aids, New Product Development, Operational Studies; ATC Analysis; Simulation.

HISTORY Aviation Planning Services Ltd (APS) was formed in 1967 as a Canadian branch of R Dixon Speas Associates of New York. In 1971, it was incorporated under the authority of the Canadian Corporation Act. Since its inception, the company has performed approximately 360 projects for over 100 clients both domestic and in 28 countries outside of Canada.

CAPABILITY APS was formed to provide professional consulting services to all sectors of the aviation industry. Major activities are directed toward commercial air transportation, airport planning, general aviation, product analysis for aerospace manufacturers, maintenance base planning, equipment procurement, airport and airspace simulation, and aviation system planning and development programs for industry and government.

The multi-disciplinary staff consists of specialists in engineering, flight operations, airline economics, aircraft maintenance, aircraft noise impact, and aviation products marketing. APS project supervisors average more than 25 years of aviation experience, both in industry and consulting services. The firm is dedicated to keeping pace with the latest developments in all facets of the industry and maintains an up-to-date library of research reports and aviation statistics.

APS developed a technique for the use of aircraft flight simulators equipped with computer-generated imagery for the evaluation of prospective airports. The firm is currently working on behalf of Canadaair in the market assessment and marketing assistance of the stretched CL-601, designated the "regional jet." As consultants to the airline industry, the firm has also developed a number of procedures in the sizing of new maintenance and overhaul facilities which have been utilized on both domestic and overseas projects. The clientele of APS consists of international airlines, business aircraft operators, foreign, federal, provincial and local governments, financial and industrial organizations, and aircraft manufacturers. The high ratio of repeat business is an indication of the confidence these diverse groups have in the capabilities of the company.

AVERAGE WORK FORCE: Professionals - 9
Outside Consultants - 5-20
Support Staff - 4

GROSS SALES: 1988 - \$750K
1989 - \$650K

PLANT SIZE: 4,100 sq ft

EQUIPMENT: Several IBM-compatible personal computers with associated laser prints and office productivity software.

EXPERIENCE: The firm has provided professional consulting services to organizations including major air carriers, international agencies, overseas government agencies, Canadian government agencies, aerospace manufacturing and sales organizations, and financial and business organizations.

REVISED: Mar 90

AVTECH ELECTROSYSTEMS Ltd

ADDRESS: (Mailing)
PO Box 5120, Station F
Ottawa, Ontario
Canada K2C 3H4

(Location)
55 Grenfell Crescent
Nepean, Ontario
Canada K2G 0G3

CONTACT: Dr W J Chudobiak, President
Tel: (613) 226-5772
Fax: (613) 226-2802

KEYWORDS: Bias Insertion Units, DC Powered Modules, High Speed Pulsers, Impedance Transformers, Impulse Generators, Inverting Transformers, Laser Diode Drivers, Linear Pulse Amplifiers, Monocycle Generators, Nanosecond Devices, Power Splitters, Pulse Amplifiers, Pulse Generators, Scope Probes, Solid State Devices, Transformers, Waveform Generators; Waveform Instrumentation.

HISTORY. Avtech Electrosystems Ltd is a small, private Canadian, high-technology company incorporated in 1975. There are no other branches or affiliates in Canada or the US. The company is represented in France, West Germany, Japan, Austria, the UK, Taiwan, Sweden, Norway, Denmark, Finland, the Netherlands, Belgium, Luxembourg, and Switzerland.

CAPABILITY: Avtech was established for the purpose of designing and marketing nanosecond waveform instrumentation. Since its start, it has become recognized as a leading supplier of nanosecond waveform generators and accessories with over 200 models. Their product line includes pulse generators, laser diode drivers, impulse generators, monocycle generators, pulse amplifiers, samplers, transformers, power splitters, bias insertion units, and scope probes.

The all solid state waveform generators are available as stand-alone lab instruments, or as miniature DC powered modules. The amplitude and the voltage rate of rise for some of their units are at least an order of magnitude higher than those provided by standard tunnel diode pulse generators. The combination of some aspects of microwave-integrated-circuit technology with ultra-fast semiconductor-device-switching technology (including SRD, hot carrier diodes, avalanche, VMOS, and bipolar switches), has yielded 100 psec rise and fall times, PRF beyond 250 MHz, amplitude to 500 volts, peak currents to 100 amperes, and single cycles of RF to 1500 MHz. They can design, develop and build to customer requirements.

Avtech's large line of laser diode drivers covers the range from 100 mA pulses with 100 psec rise times to 100 Amp pulses with 500 nsec rise times and peak power to 25,000 volts. Avtech's inverting and impedance transformers are designed to be used with general purpose laboratory pulse generators, with subnanosecond rise time pulse generators and circuits, and other units.

Avtech's power splitters provide two outputs which are either both in phase (non-inverted) with the input signal, or with one output non-inverted and with one inverted. They are designed for use with nanosecond speed laboratory pulse generators, with CW signals, or with other units to frequencies as high as 1.0 GHz. Their bias insertion unit is designed for both CW and subnanosecond rise time base band pulse applications. The scope probe was designed to be used with a 50 ohm sampling oscilloscope, to allow probing of test points in microstrip structures, and in discrete RF circuits and subnanosecond pulse circuits, operating at frequencies as high as 5 GHz and with rise times as low as 100 psec.

AVERAGE WORK FORCE: Total - 8

GROSS SALES: 1988 - \$1.2M
1989 - \$1.2M

PLANT SIZE: 6,000 sq ft

EXPERIENCE: Approximately 98% of Avtech's sales are export. Their products have been supplied worldwide to companies, universities, and government agencies; e.g., USAF, Sandia National Labs, Los Alamos Scientific Laboratories, Hewlett Packard, Honeywell, Hughes Aircraft, Lawrence Livermore Laboratories, Martin Marietta, Bell Northern Research, etc.

REVISED: Mar 90

B M HI-TECH Inc

ADDRESS: PO Box 97
12 Stewart Road
Collingwood, Ontario
Canada L9Y 3Z4

CONTACT: Dr S E Prasad, President
Tel: (705) 444-1440
Fax: (705) 444-6787

KEYWORDS: Piezoelectric Materials, Materials (Piezoelectric), Infrared Glass; Laser Materials.

HISTORY: B M Hi-Tech, Inc is a wholly-owned subsidiary of Sensor Technology Limited. Since incorporation in 1983, the company has grown steadily and offers a comprehensive range of piezoelectric ceramics and components.

CAPABILITY: B M Hi-Tech Inc produces a full range of advanced piezoelectric materials and acoustic components including sensors that have been developed through close cooperation with its customers. Other products made by the company include glasses for infrared applications and specialty electronic ceramics. B M Hi-Tech's research and development group is constantly looking at new materials and process technology.

B M Hi-Tech's products include:

- Piezoelectric ceramics, modified compositions of lead zirconate titanate (PZT), leadmetaniobate (PMN), and lead titanate (PT).
- Non-destructive evaluation (NDE) components to 50 MHz.
- Infrared glasses, glass ceramics, and laser materials
- Sensors and devices: monolithic, multilayer and composites.
- Process instrumentation:

B M Hi-tech's services include:

- Custom fabrication of ceramic materials and components.
- Pressure sintering.
- Silver, gold, and nickel metallization.
- Military Standards (MIL-STD) compliance and configuration.

AVERAGE WORK FORCE: No data.

GROSS SALES: No data.

PLANT SIZE: No data.

EQUIPMENT: No data.

EXPERIENCE: The company currently exports its products to the US and to the European community

REVISED: Apr 90

BARON COMMUNICATIONS Ltd

ADDRESS: 2779 Lake City Way
Burnaby, British Columbia
Canada V5A 2Z8

CONTACT: Mr Harry Baron, President
Tel: (604) 420-2087

KEYWORDS: Alarm Systems, Based Tone Signalling, Communications, Computers; Microprocessors; Microwave Systems; Mobile Control Heads; Status Systems; Telephone Communications; Telephone Interconnect Terminals; Tone Signalling.

HISTORY: Baron Communications was formed in 1981 as a wholly-owned Canadian corporation with representatives in Washington, Oregon, California, Arizona, and Illinois.

CAPABILITY: Baron specializes in the manufacture, design, and development of various types of tone signalling, alarm and status, and control systems, radio and telephone interconnect terminals, and associated mobile control heads

AVERAGE WORK FORCE: 8

GROSS SALES: 1988 - \$125K
1989 - \$150K

PLANT SIZE: 2,000 sq ft

EQUIPMENT: Baron's equipment consists of Exorcisor II-Computer Development System 96K RAM, 1M disc capacity development module for 6800-6802 & 6801 processors, PROM programmer, and EPROM programmer with Exorterm 150 console & model 703 printer. They also have the usual assortments of oscilloscopes, VTVMs, spectrum analyzers, temperature environment chambers, transmission test sets, etc., necessary for the design and development of advanced circuitry.

EXPERIENCE: Baron is a recognized and accredited supplier of tone signalling equipment and systems (DTMF, in band, single tone, two tone simultaneous or sequential) to Motorola, GE, Pacific Northwest Bell Telephone Co, Michigan Bell Telephone Co, General Telephone & Equipment, Getty Oil Company, ALASCOM, AT & T, US Army Corp of Engineers, and the RCMP.

REVISED: Mar 90

BARRINGER RESEARCH Ltd

ADDRESS: 304 Carlingview Drive
Rexdale, Ontario
Canada M9W 5G2

CONTACT: Mr John Davies, President
Tel: (416) 675-3870
Fax: (416) 675-3876

KEYWORDS: Airborne Electromagnetic Sensor, Airborne Laser Fluorosensor; Data Analysis; Electro-Optics; Environmental Analysis; Explosives Detection Systems, Narcotics Detection Systems, Hazardous Gas Detection, Infrared Instrumentation, Instrument Manufacture, Metal Detection; Remote Gas Detection; Remote Sensing; Signal Processing; Spectroscopy; Trace Gas Detection.

HISTORY: Barringer Research was founded in 1961 to develop geophysical and geochemical techniques and instrument systems relating to mineral exploration. Barringer Resources Inc (formerly Barringer Research Inc) was incorporated under the laws of the State of Delaware on 7 Sep 67 for the purpose of acquiring all of the issued and outstanding voting stock of Barringer Research Ltd, an Ontario (Canada) corporation.

CAPABILITY: Barringer has undertaken research projects primarily in the earth sciences in the disciplines of geology, geochemistry, electro-optics electromagnetics, magnetics, and atmospheric physics. As a result of such projects, they have developed instrument systems and techniques in the fields of airborne and ground mineral exploration and environmental and process monitoring. They have, during the past five years, devoted a substantial portion of their efforts toward adapting for oil and gas exploration instrument systems and technology that they initially developed for mineral exploration. Recently, emphasis has been placed on military equipment for trace gas and liquid detection, and on rapid detection of drugs, explosive vapors, and counterfeit bullion.

• Airborne Electromagnetic Systems - INPUTm (INduced PULse Transient), the most widely used airborne EM system in the western world for over 20 years; COTANtm (CORrelation of TRANsients), an improved EM system offering greater depth penetration.

• Metal Detection Systems - Adaptation of above EM systems to specialized applications, and counterfeit bullion detector systems.

• Ion Mobility Spectrometers - IONSCANtm, for detection of explosives and narcotics.

• Reflectance Spectroscopy for Remote Sensing - Hand-held rationing radiometer (HRRR), field portable reflectance spectrometer (REFSPEC), and airborne laser fluorosensor systems.

• Trace Gas Detection - SO₂ or NO₂ remote sensor, COSPECTm; gas filter correlation spectrometer for passive infrared remote sensing, GASPECTm; mercury and its compounds in the environment; and microwave emission detection for gas chromatographic studies of pesticides and organics in the environment.

- Collection Systems for Analytical Geochemistry Studies - AIRTRACEm helicopter or fixed wing collection of aerosol samples, SURTRACEm helicopter or ground based collection of surface samples, and LASERTRACE, a rapid, inexpensive, multi-element analysis of samples

- On line Process Stream Analysis Heavy water analysis for CANDU nuclear reactors and heavy water manufacturing

AVERAGE WORK FORCE: Engineers & Scientists - 14
Technical Support - 16

Barringer Research retains on staff a diverse group of scientists and engineers in the physical sciences. The professional and supporting technical staffs shown above are for Barringer Research Ltd only. The total US and Canadian professional strength including Barringer Laboratories Inc is 55 scientists and engineers.

GROSS SALES: 1988 - \$2.5M
1989 - \$3.0M

PLANT SIZE: 28,700 sq ft

EXPERIENCE: Barringer experience is worldwide. Recent R&D clients include Transport Canada, Revenue Canada, British Petroleum, Petro-Canada Explorations Inc, TRW Systems Group (USA), National Research Council of Canada, Canadian Department of National Defence, Ontario Hydro, Department of Supply & Services (Canada), and Rexnord Inc (USA). US DOD clients include US Customs and AMC-COM, "UV Surface Sampling for Explosives."

REVISED: Mar 90

BARSCAN Inc

ADDRESS: #120 - 1575 W Georgia St
Vancouver, British Columbia
Canada V6G 2V3

CONTACT: Mel J Endelman, President
April McCrea, Manager
Tel: (604) 683-7226
Fax: (604) 683-6725

KEYWORDS: Bar Code (Scanners/Labels), Labels (Bar Code), Data Collection Systems.

HISTORY: Barscan Inc is a Canadian-owned, data collection system integrator founded in 1982. It was originally called Bar Code Applications Ltd. There is a wholly-owned, US subsidiary called Bar Code Applications Inc located in Blaine, Washington.

Originally formed to supply bar code labels and scanners to libraries, the company now includes manufacturing and distribution facilities

CAPABILITY: Barscan Inc and Bar Code Applications Inc are involved with replacing the writing and key entry function with automatic data entry. This involves the system design and supply of the appropriate data collection equipment to perform the desired function. The equipment includes on-line bar code scanners and printers, radio frequency terminals and tags, software, and educational seminars. We perform both public and private seminars on data collection, available equipment, and how to evaluate and install a data collection system

AVERAGE WORK FORCE: Equipment/Software Specialists - 4
Support Staff/Sales - 5
System House Associate Firm - 6

GROSS SALES: 1988 - \$1.3M
1989 - \$1.6M

PLANT SIZE: No data.

EQUIPMENT: No data.

EXPERIENCE: Mel Endelman has been installing bar code installations since 1979. He is one of the foremost experts in Western Canada and has been written up in numerous international publications. The company's customers include the Canadian Federal Government, Departments of Industry Science & Technology, Justice, Fisheries, and Correctional Institutes. Barscan has been the supplier of choice for bar code labels and scanners for the Province of British Columbia. The company has also supplied labels and printers to the US Navy and the Office of the President.

REVISED: Mar 90

BENDIX AVELEX Inc (Allied-Signal Aerospace Canada)

ADDRESS: Mailing,
PO Box 2140
St Laurent, Quebec
Canada H4L 4X8

Plant:
200 Laurentien Blvd
St Laurent, Quebec
Canada H4M 2L5

CONTACT: Mr Robert Egery, Vice President, Marketing
Tel: (514) 744-2811
Fax: (514) 748-4419

KEYWORDS: Artillery Alignment & Control System; Avionics; Brake Parts; Compass Systems; Drone Alignment Systems; Electro-Optics; Engine Fuel Control Systems; Fuel Control; ILS; Image Intensification; Instruments; Machining; Navigation; Navigation Systems; Night Vision; Precision Machining; R&O (Avionics); R&O (Components); Radar; Simulators; Thermal Imaging; Training; Wheel Parts.

HISTORY: Bendix Avelex Inc is a unit of Allied-Signal Aerospace Canada. From its beginning in Montreal, Quebec (1981), Bendix Avelex has grown into a world-class supplier of high-technology defense electronics and aerospace products and services. Products include thermal imaging systems, night vision goggles, vehicle navigation systems, artillery gun alignment and control systems, high fidelity video interactive gunnery simulators, operational tactical training simulators, and aircraft engine control systems and accessories. Services include repair and overhaul and comprehensive after-sales services and product support.

CAPABILITY: Bendix Avelex has established solid expertise in a wide range of engineering disciplines which include digital/analog electronics, software development, electro optics, thermal imaging, lasers, simulation, communications, geo-magnetics, pneumatics, and fluid dynamics and hydro-mechanics.

These broad engineering skills are applied to the design of highly reliable products meeting stringent specifications in the fields of defense, aerospace, and general aviation for national and international customers.

The electronics manufacturing facility is equipped with latest generation continuous flow soldering and conformal coating equipment, environmental test cells which include sinusoidal and quasi-random vibration systems, burn in chambers, automatic test equipment for PCB diagnostics and repair, and a class 100 clean room. The precision machining facility reflects the latest advances in metal removal technology, capable of consistently achieving tolerances of 50 millionths of an inch. High performance machines include 3 and 4 axis CNC and DNC machining centers, CNC lathes, programmable precision grinders and many other sophisticated machine tools.

The Bendix Avelex total quality concept ensures that reliability and dependability are designed in the product. This philosophy is an essential requirement when meeting the stringent demands of the aerospace and defense market place. This quality control system meets Canadian, US, and NATO standards (AQAP-1) and is approved by the Canadian airworthiness authorities.

The Support Services Division of Bendix Avelex provides a diverse range of integrated logistic support services. These include complete life cycle management and systems engineering support services, technical publications, training programs, as well as the traditional repair and overhaul of Bendix Avelex proprietary aerospace and defense products. In addition, support is provided for the products of more than 300 different original equipment manufacturers. With this wide range of capabilities and expertise, Avelex is a competitive alternative source for US DOD repair and support programs. The company is a major supplier of support services to the Canadian Department of National Defence, Transport Canada, and to aerospace and defense contractors. The following "customer oriented" organization structure illustrates the company's commitment to provide responsive, timely, and cost-effective support:

- Three specialized operations groups, each equipped with dedicated management, logistic, and test engineering resources as well as independent quality assurance staff. The groups specialize in electronic systems, gas turbine engine controls, and the support services group which includes ILS planning and analysis, engineering support services, and a bilingual technical publications capability.
- The whole operation is supported by an integrated configuration control and data management group.

Bendix Avelex' support capabilities span 64 NATO stock classes, the most prominent being 1630, 1650, 1660, 1680, 2915, 2925, 2995, 4320, 4810, 4920, 5826, 5855, 6125, 6610, 6615, 6620, 6665, 6680, and 6685.

AVERAGE WORK FORCE: Engineering - 125
Production - 325
Marketing - 20
Others - 325

GROSS SALES: 1988 - \$85M
1989 - \$89M

PLANT SIZE: 220,000 sq ft (Montreal)
32,000 sq ft (Vancouver)
21,000 sq ft (Cornwall)

EXPERIENCE. Bendix Avelex Inc's present customers include the Canadian Department of National Defence (Gun Alignment and Control systems, Electro-optics, Night Vision Systems, Video Interactive Gunnery Simulators, Operations Tactical Training Simulators, repair and overhaul of aircraft instruments, accessories, navigation aids and airborne radar), Transport Canada (Position Adjustable Range Reference Orientation Transponders), Pratt and Whitney Canada (engine control systems), Air Canada (wheel and brake parts and instruments), deHavilland (avionics equipment, flight and engine instruments and accessories), Canadair (electrical connectors, drone alignment systems and aircraft accessories), General Electric (USA) (engine fuel control systems), and Martin Marietta (Optical Encoder).

REVISED: Apr 90

BOEING CANADA TECHNOLOGY Ltd (Arnprior Division)

ADDRESS: Baskin Drive East
Arnprior, Ontario
Canada K7S 3M1

CONTACT: Mr Jim Sawyer, Vice President & General Manager
Tel: (613) 623-4267
Fax: (613) 623-2224

KEYWORDS: Electrical/Electronic Modification; Engineering Services; Flight Test Equipment; Ground Support Equipment; Heat Treating; Helicopters; ILS; Logistic Support; Machining; Modification (Helicopters); Painting (Aircraft); Precision Machining; Publication Service, R&O (Aircraft), R&O (Components), R&O (Helicopters), Sheet Metal Detailed Parts; Technical Investigations; Tooling.

HISTORY. Piasecki Helicopter Corporation of Canada Ltd was formed in 1953 as a repair and overhaul base for RCAF H-21 helicopters. In 1956, Piasecki was changed to Vertol Aircraft Company (Canada) Ltd, and in 1959, it was renamed Canadian Vertol Aircraft Ltd. In 1960, Boeing purchased Vertol and the name was changed to Boeing of Canada Ltd. In 1988 Boeing of Canada Ltd., Arnprior Division, became Boeing Canada Technology Ltd., Arnprior Division. Boeing Canada Technology Ltd. is a subsidiary of The Boeing Company in Seattle, Washington.

CAPABILITY. The following is a breakdown of some of the programs Boeing Canada, Arnprior Division, is currently involved in.

- **Boeing Commercial Airplane Program:** Manufacture of machine shop and sheet metal shop detail parts in support of 737/747/757/767 Boeing commercial airplane programs. Includes manufacture and assembly of all 757/767 electronic trays and shelves and is the key supplier of major components for the 767 engine strut.
- **Lag Damper Program:** The Arnprior Division is the principal manufacturer under license of the 107 type helicopter lag damper. The lag damper is a sophisticated hydraulic component which forms part of the helicopter rotor hub assembly. This product is distributed world-wide.
- **Depot Level Inspection and Repair Program.** This program includes airframe repair and overhaul for CH113/113A/147 helicopters.
- **Component Repair and Overhaul Program:** A repair and overhaul program for dynamic and non-dynamic components for the CH113/113A/147 helicopters.
- **Technical Publications:** Provides revisions and updates for Technical Publications in support of CH113/113A/147 helicopters.
- **General Helicopter Support Programs:** Boeing of Canada Ltd, Arnprior Division, is extensively involved in Technical Investigations and Engineering Services, Manufacture of Airframe Parts, Tooling and Ground Support Equipment, Painting of Aircraft and Detail Parts, Flight Test Equipment and Logistics Support.

AVERAGE WORK FORCE: Production Workers - 520
Engineering & Technical Support - 60
Administration & Management - 120

GROSS SALES: 1988 - \$48M
1989 - \$52M

PLANT SIZE: 25,000 sq ft (Aircraft Overhaul Facility)
80,000 sq ft (Manufacturing Facility)
150,000 sq ft (Total Facility)

EQUIPMENT: Complete range of sheet metal and machine shop capabilities including support facilities for process, heat treat, NDT, and paint. CAD/CAM system is now installed and a DEC-based MRP system will be installed in 1990.

EXPERIENCE: Present customers include Canadian Forces, Boeing Commercial Airplane Company, Boeing Helicopter Company.

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BOEING CANADA TECHNOLOGY Ltd (de Havilland Division)

ADDRESS: Garratt Blvd
Downsview, Ontario
Canada M3K 1Y5

CONTACT: Mr George M Georgas, Director, Government Marketing
Tel: (416) 375-4118
Fax: (416) 375-4540

KEYWORDS Air Delivery Systems, Aircraft, Aircraft Control, Airframe Components, Airframe Structures, Augmentor Wing, Cargo Handling Equipment, Cockpit Displays, Composite/Fiberglass Components, Engine Components, Engine Controls, Engine Systems, Environmental Control, Extended Length Machining, Fuel Research, Fuel Systems, Hydraulics, Instruments, Landing Gears, Machining, Navigation, Performance Measuring Devices, Personnel Survival/Restraint, R&O (Aircraft), Simulators, STOL Aircraft Manufacture, Training, Tubing, Wiring.

HISTORY The de Havilland Aircraft of Canada Ltd was established in 1928 as a sales outlet, assembly plant, and maintenance facility for aircraft of the British parent company's design and manufacture. Now owned by The Boeing Company, the de Havilland Division is located in Downsview, Ontario, Canada, with offices in Ottawa.

CAPABILITY Boeing Canada, de Havilland Division, is a leader worldwide in the design and manufacture of new-generation turboprop aircraft for civil and military applications. During the time period 1939-1945, the company built over 3,000 Mosquito bombers, Tiger Moths, and Anson trainers. In 1946, the British-designed Fox Moth was manufactured at Downsview, as the Canadian division prepared to launch its own design, the DHC-1 Chipmunk trainer. That was followed by the DHC-2 Beaver, which was designed for northern Canadian bush operations and found a home in civil and military roles worldwide. Nearly 1,700 of this type were manufactured between 1947-67. The Beaver pioneered in short take-off and landing (STOL) technology and played a vital role in developing regional air transport in more than 70 countries.

The Beaver was followed by a larger version, the DHC-3 Otter, which in turn was followed by the military STOL, twin-engine DHC-4 Caribou.

In the 1960s, de Havilland combined turbine technology with STOL experience and began to manufacture the remarkable twin-engined Buffalo and Twin Otter aircraft. Market interest in a larger capacity transport made it possible for de Havilland to develop a quiet, four-engined, STOL aircraft, the Dash 7. As a strong regional air transport market evolved, de Havilland utilized the advances in turbine technology to design and manufacture the Dash 8, a new generation, twin-engined turboprop introduced to service in late 1984. For government and military applications, the Dash 8 series 100 and series 300 are offered in a platform version adaptable to transport, navigation training, surveillance, maritime patrol (Triton), medevac, search and rescue, and flight calibration roles.

de Havilland's R&D activity typically divides into powered lift, propeller refinements, and advance composite structures. Powered lift focus has been upon ultra STOL capability and has been supported by an augmentor-wing flight test program and by extensive wind tunnel testing both in the National Aeronautical Establishment tunnels in Ottawa and the 40 ft x 80 ft tunnel at NASA Ames. This research program has extended progressively to STOL and VTOL research and currently concentrates upon an ejector lift/vector thrust concept in a program sponsored by NASA and supported by General Dynamics.

Propeller development, motivated by company concentration upon turboprop transports, has investigated thin, rear-loaded blade sections. Wind tunnel test modelling techniques have been developed and have led to propeller/nacelle combinations testing in the National Aeronautical Establishment 30 ft x 30 ft tunnel at Ottawa at Reynolds Numbers, close to full scale.

Advanced composite structural development has been directed to both Kevlar/Nomex sandwich design and manufacture and, more recently, to carbon structures for primary application.

AVERAGE WORK FORCE: 5,800

GROSS SALES: No data.

PLANT SIZE: 2,000,000 sq ft (plant & office)

EQUIPMENT: For many years the de Havilland plant has been engaged in the production of stressed skin aluminum alloy airframes, and in doing so, utilizes equipment normally found in a well-equipped aircraft manufacturing complex. The present shop equipment includes milling machines; engine, turret, and pre-programmed automatic lathes; drill presses; punch, hydro, and stretch presses; magnetform; shapers and rolls; jogglers, tube bending and swaging machines; precision grinders;

planers, multi-spindle routers, spot and heli-arc welders, vertical and jig borers, and broaches and shears. In addition, heat treat, foundry, painting, sandblasting, glass beading, and other treatment equipment is available. Hydraulic, instrument, radio, plastic, and upholstery shops also form part of the complete facility. The plastic shop manufactures fiberglass, kevlar, phenolic honeycomb, and polycarbonate parts in a temperature and humidity-controlled environment. It is also fully equipped with autoclaves, ovens, bonding, and decorative applicator presses for the manufacture of structural kevlar composite parts and aircraft interiors. Numerically controlled equipment consists of drafting and digitizing machines, several multi-spindle profile mills which include a pair of dual gantry 3-spindle 5-axis vertical profilers, wire marking machines, a pipe bender complete with a tube data center, and a Zenford Ziegler drill and route machine.

The company uses the CADAM system of interactive computer graphics in support of both CAD and CAM functions. Availability of this system has permitted an integration of the design/manufacturing function.

de Havilland also maintains an engineering library, metallurgical laboratory, an aerodynamics laboratory, a Structural Testing Department, a materials research laboratory, environmental chambers, and an engineering computer center. In addition, an engineering development shop, housed in a separate 11,000 sq ft building, consists of 100 skilled tradesmen experienced in working directly with the engineering staff. The data center is equipped with an IBM 3031AP and an IBM 4341/12. The 4341/12 is dedicated to engineering. In addition, the Engineering Department has a VAX 11/780 computer used primarily for structural analysis.

EXPERIENCE: Contracts for both aircraft purchases and research and development programs have been negotiated with the USAF, NASA, US Department of Interior, USAF Academy, Alaska National Guard, Canadian Forces, Canadian National Research Council, and the Canadian Department of Transport. In addition to the above, the de Havilland product line is presently being operated in over 70 countries worldwide and on all seven continents. Previous DOD contracts include:

- 981 L20 DHC-2 Mk1 Beaver aircraft to the USAF/US Army.
- 165 DHC-4 Caribou aircraft to the US Army.
- CV7A Buffalo aircraft development.
- SC8A Air Cushion Landing System.
- 6 UV18A DHC-6 Twin Otter aircraft to Alaska Army National Guard.
- 2 UV18B DHC-6 Twin Otter aircraft to USAF.
- 2 E9-A Dash 8 platforms to USAF (through Sierra Research)

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BOEING CANADA TECHNOLOGY Ltd (Winnipeg Division)

ADDRESS: 99 Murray Park Road
Winnipeg, Manitoba
Canada R3J 3M6

CONTACT: Mr E M Sloane, Director, Marketing
Tel: (204) 888-2300
Fax: (204) 888-2951

KEYWORDS: Advanced Composites; Aerial and Surface Target Systems; Airframe Components; Airframe Structures; Composite Components; Filament Winding; Components (Aircraft); Graphite Epoxy Components; Laminates (Solid & Sandwich); Materials Development; RPV, Systems Engineering; Sandwich Components; Space Systems (Composites).

HISTORY: The Boeing Winnipeg plant was established in 1971 and is a wholly-owned subsidiary of The Boeing Company of Seattle. There are two other Canadian divisions: one located in Arncliffe, Ontario, and one in Toronto, Ontario.

CAPABILITY: Boeing Canada Winnipeg is a Canadian leader in the design and manufacture of high-strength/weight ratio fiber composite plastic components. Glass fiber and advanced fiber composite components are currently produced for a diversified range of structural and

non-structural applications covering a technological spectrum including aircraft, satellite components, and other advanced technology products. The company has the engineering, manufacturing, and development expertise to design, fabricate, and assemble solid laminate or sandwich panel components. Glass fiber and high-modulus graphite and organic fibers combined with thermosetting resin systems, including epoxies, polyesters, phenolics and bismaleimides, are used with the state-of-the-art facility.

A stated objective of the company's management team is to establish Boeing Canada as a "world class" center of excellence for composites manufacture within the Boeing Company and as the Canadian leader in the composite industry. To achieve this objective, an expanded research and development capability, increased engineering tool design and fabrication capabilities, and automated numerically controlled process and inspection equipment have been installed.

Diversification into aerial and surface target systems, including their design, development, test, supply, and operation has resulted in the assembly of a Boeing Canada target family which is available internationally.

The Winnipeg Division's Quality Assurance Program operates to one standard of quality which is in conformance with the requirements of the Ministry of Transport Engineering and Inspection Manual (FAR Part 21, Subpart G), NATO Quality Control Systems Requirements for Industry AQAP-1 (similar to MIL-Q-9858A), and with the Boeing Company Corporate Document DI-8000A. Quality is maintained throughout the manufacturing process by inspectors appointed by the Manager of Quality Assurance who in turn is approved by the Ministry of Transport. Complete laboratory tests are carried out on process test panels as required by customers and/or pertinent authorities. All raw materials are purchased from qualified suppliers, and incoming shipments are subject to Quality Control receiving inspection to ensure that all requirements are met.

AVERAGE WORK FORCE: Engineering Design - 51
Quality Assurance - 95
Production - 1100
Admin - 259

GROSS SALES: 1988 - \$91M
1989 - \$110M

PLANT SIZE: 410,000 sq ft (manufacturing space)
59,000 sq ft (office space)

EQUIPMENT: Major equipment includes:

- Four autoclaves (ranging from 4 ft dia by 10 ft long to 15 ft dia by 35 ft long) capable of 95 psi pressure and 625°F ambient temperature.
- Two air-heated ovens with capacity up to 8 ft wide by 13 ft long by 8 ft high and a maximum ambient temperature of 800°F.
- Various core cutting and numerically controlled core milling machines capable of handling core sheets up to 10 ft long by 6 ft wide by 6 inches thick.
- Numerically controlled pre-preg cloth kitting/nesting and component trimming machines.
- Drivmatic riveting machines.
- Hydraulic core forming press with 4 ft by 4 ft platen.
- Two waterfall spray painting booths (12 ft by 12 ft) and one dry painting booth (20 ft by 30 ft).
- Two flame spray booths (360 sq ft total) and apparatus capable of hard and soft ferrous and non-ferrous metal spraying.
- Automated through transmission, water jet scanning ultrasonic system with C-scan data acquisition (10 ft by 30 ft part size capacity).
- A McLean Anderson, Explorer Model D, Filament Winding Machine, capable of producing a part approximately 150 in long by 9 in dia.

- 2 and 4 axis numerically controlled filament winding machine (20 ft long by 4 ft dia maximum capacity).

EXPERIENCE. Boeing-Winnipeg produces composite components and sub-assemblies for all Boeing commercial aircraft. Major sub-assembly work packages include the 747 wing-to-body fairing and 767 engine strut fairing. Significant contracts for: graphite composites for Satcom and Anik D satellite programs and missile components have been conducted.

Boeing Winnipeg customer names include.

- Avco - missile components.
- Bristol Aerospace Ltd - rocket motor case development.
- Pratt & Whitney - composite air inlets for turbine engines.
- SPAR Aerospace - graphite epoxy plates, waveguides, and satellite components.
- Dept of National Defence - design and development of aerial target system (fixed wing, rotary wing, towed, and rocket boosted) and sea/land surface targets.
- US Army - aerial target systems.

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BRISTOL AEROSPACE Ltd

ADDRESS: 660 Berry St
PO Box 874
Winnipeg, Manitoba
Canada R3C 2S4

Rockwood Propellant Plant
Stony Mountain, Manitoba
Canada (20 miles from main plant)

CONTACT: Mr Keith Burrows, Vice President Aircraft
Tel: (204) 775-8331
Fax: (204) 885-3195

KEYWORDS: Airframe Components; Airframe Structures; Chemical Vapor Deposition; Composites; Coatings; Data Acquisition; Die Fabrication; Engine Components; Engine Systems; Gas Turbine Components; Overhaul Gear Boxes; Heat Treating; Helicopter Subsystems; Helicopter Wire Strike Protection; Hydraulics; Instrumentation; Machining; Metalworking; Non-Destructive Testing; R&O (Aircraft), R&O (Engines), R&O (Helicopters), Remote Inspection Systems, Rocket Engines; Rocket Propellant; Rocket Launchers; Rockets; Stamping; Titanium; Tooling; Transmissions.

HISTORY: Bristol was founded in 1930 and incorporated in Canada in early 1947. It is a wholly-owned subsidiary of Rolls Royce Industries Canada Inc. Bristol owns and operates the Rockwood Propellant Plant at Stony Mountain, Manitoba.

CAPABILITY: Since inception in 1930, Bristol has moved from manufacturing and repairing seaplane floats (1930-1943) to a company with many distinct products and areas:

- Bristol manufactures "Hot End" gas turbine components and remanufactures afterburner assemblies under contract to General Electric, Pratt & Whitney, Rolls Royce, and AVCO Lycoming.
- Bristol manufactures light alloy aircraft structures for major aircraft such as DHC-7, DHC-8, 767 and 747. They also manufacture small structures including the Wire Strike Protection System for helicopters.
- Bristol offers repair and overhaul of military and commercial, fixed wing and rotary wing aircraft.

- Engineered products manufactured by Bristol include rocket motors, rocket system components and propellants, electronic data instrumentation for payloads and satellites, and electronic data instrumentation for remote site applications. They also provide services in mechanical, electrical, aeronautical, and propulsion design and development engineering. Other services include precision weldments of high-temperature stainless steel alloys, titanium, and corrosion-resistant materials, and a helicopter component test cell for transmissions and gear boxes.

- Bristol also manufactures the Black Brant sounding rocket and CRV7 Rocket Weapon System.

AVERAGE WORK FORCE. Salaried - 521
Hourly - 1160
Technical - 200

GROSS SALES: 1988 - \$110M
1989 - \$140M

PLANT SIZE: Production - 561,000 sq ft
Warehouse - 95,000 sq ft
Office - 121,000 sq ft
Acreage - 3,000 acres

EQUIPMENT Complete facilities and equipment for metal forming, welding, machining, and metal treating. They have a complete range of computer numerical control (CNC) machining equipment such as Sandstrand S80/S60/OM2A, 5 axis machining center, Mazak V20/V5, 3 axis machine center; 4 Giddings Lewis 48" swing CNC vertical turning lathes (VTL); 3 Mori Seiki CNC horizontal turret lathes; and a Mazak CNC horizontal mill center with robot loading. They also have 2 Raycon CNC EDM machines and 2 electron beam welders, one of which is a Sciaky CNC machine with 54" x 50" x 54" chamber.

Also included is a McAuto CAD/CAM system with 3 VAX 8350 computers, 6 HP workstations, 16 design terminals, and Calcomp Plotter and Interim DNC system to the CNC machines

Special facilities include a helicopter test cell, non-destructive test laboratory, electronic test laboratory, and a CNC 4 axis coordinate measuring machine (CMM).

EXPERIENCE. Approximately 60% of Bristol's sales are exported, with over 50% of these sales to the US military.

Canadian customers include DND, National Research Council, Pratt & Whitney of Canada Ltd, Boeing Canada Ltd, Boeing de Havilland Canada Ltd, and others. International clients include the USAF, BWB (Germany), Dornier GmbH (Germany), Aerospatiale, and the Swedish Space Corporation.

Bristol has been approved by the Canadian Ministry of Transport for Canadian aircraft maintenance, and the Canadian Forces for manufacturing testing and overhaul. The quality requirements of MOT and FAA and the Canadian DND 1015 or MIL-Q-9858A are met for manufacturing, repair, and overhaul.

REVISED: Mar 90

BRITCO STRUCTURES Ltd

ADDRESS. 5960 Glover Road
Langley, British Columbia
Canada V3A 4H9

CONTACT Mr J M (Jack) Gin, Director, Marketing
Tel: (604) 530-2324
Fax: (604) 530-6242

KEYWORDS. RF Shielding, EMP Shielding, Shielded Rooms, Screen Rooms, Building (Portable), Equipment Shelters.

HISTORY. Britco Structures Ltd is a Canadian owned, British Columbia-based company founded in 1977.

CAPABILITY. Britco Structures Ltd is a leading manufacturer of rigid portable buildings. They specialize in the following applications.

- EMI Shielded Equipment Shelters
- Helicopter Transportable Structures
- Hercules Transportable Structures
- Military Personnel Shelters
- Mobile Test Facilities

Britco offers a complete engineering, procurement, quality controlled manufacturing, transportation, and installation service of portable and modular buildings.

Britco products are custom engineered for extreme environments and include electrical and mechanical systems. All-welded EMI shielded shelters providing 120 db attenuation have been applied to the North Warning Systems (NWS). Modular camps have been transported by Hercules aircraft to remote northern locations complete with furnishings, kitchens, and wash facilities.

Britco's specifications and compliances include NATO AQAP Quality Assurance Specifications, MIL-STD-285 Shielding Effectiveness, USAF Class I Shielding Effectiveness, and NSA 65-6 Shielding Effectiveness.

The company's disciplines include EMI shielding systems, MIG welding, structural steel and sheet metal work, wood framing and finish carpentry work, electrical systems, and mechanical systems.

AVERAGE WORK FORCE. Management/Technical - 35
Direct Labor - 110

GROSS SALES: 1988 - \$14.0M
1989 - \$18.0M

PLANT SIZE: 100,000 sq ft

EXPERIENCE. Britco Structures Ltd's major customers include Canadian Department of National Defence, Transport Canada, Raytheon Canada, Canac/Microtel, and Telesat Canada.

REVISED: Mar 90

BRUCE D VALLILLEE ELECTRONICS Ltd (Marketing Consultants)

ADDRESS: 36 Trawley Crescent
Ajax, Ontario
Canada L1S 5X8

CONTACT: Mr Shawn D Vallillee, Vice President, Finance & Marketing
Tel: (416) 427-7968
Fax: (416) 427-7968

KEYWORDS: Marketing; Business Planning; Quality Assurance Programs; Surveys, Analysis; Sourcing; Training; Audio Visuals; Presentations; Government Relations; Marketing Research; Consulting (Marketing).

HISTORY Bruce D Vallillee Electronics Ltd was established in 1971 and is a wholly-owned, private Canadian corporation. The company has two divisions also located in Ontario, M & T Management and S C Investments. The firm was formed by Mr Bruce Vallillee who has extensive background in the Canadian, US, and European electronic and military component market. Mr Vallillee was formerly VP of Marketing & Sales, ITT Cannon Connector Division, with previous equivalent positions with Erie Technological Products, Amphenol Canada, and J R Longstaffe.

CAPABILITY: Bruce D Vallillee Electronics Ltd, Marketing Consultants, was established to create a market research, advisory, and consulting function capable of developing timely and significant information useful in determining short and long range technical marketing strategies within the Canadian/US electronics industry. The company specializes in the investigation of market opportunities relative to military offset requirements and major programs, as well as identification and pursuit of cross licensing, technology transfer arrangements. They provide an

advisory and consulting service to both industry and government on electronic components and systems. The variety of services includes business planning and quality control programs, R&D funding, sourcing, industry surveys, export analysis, "in house" training programs, audio visuals, and professional presentations.

AVERAGE WORK FORCE: Engineers - 1
Finance - 1
Others - 3

GROSS SALES: 1988 - \$500K
1989 - \$500K

Note: These figures represent consulting figures only.

PLANT SIZE: No data.

EQUIPMENT. Complete computer capabilities relative to consulting requirements.

EXPERIENCE: Present and past clients include the Government of Canada; Dept of Industry, Science, and Technology; Connector Standardization Program; BOSS Trade Shows; NEI Ferranti Packard Electronics Ltd, DGW Compar Connectors (Canada), RD Associates (Canada); Carma Industries (Canada); Numet Engineering (Canada); Inducon Design/Build Consultants and M/H Systems (Canada); IBM (Canada); Lakeview Publications (Canada); Andrew Antenna (Canada); Arrow Electronics Canada Ltd, High Technology Shows (Canada); Matrix Science Corporation (USA); Struthers Dunn (USA); Oak Switches (USA); Ellis & Watts Division, Dynamics Corp of America (USA); ITT Defense Electro Optical Products Division (USA); ITT Defense Tube and Sensor Labs (USA); A L Stainless Inc (Canada); and Burndy Canada.

A number of clients shown above are currently doing business with the Canadian Armed Forces, the USAF, and the USN. We are actively positioning several clients in the military market and wish to do business with the USAF.

REVISED: Mar 90

CAD/CAM GRAPHICS Ltd

ADDRESS: 700 Industrial Avenue
Ottawa, Ontario
Canada K1G 0Y9

CONTACT: Mr A H Jarvis, General Manager
Tel: (613) 526-0620
Fax: (613) 526-3703

KEYWORDS Circuit Layout, Microcircuits (Thick & Thin Film), PC Board Design & Fabrication; Software Services; Thick Film Hybrid Microcircuits; Thin Film Hybrid Microcircuits.

HISTORY CAD/CAM Graphics Ltd is a small, Canadian owned, high-technology company incorporated in January 1984. There are branches in Toronto (Mississauga) and Montreal, and the company is incorporated in the US as CAD/CAM Graphic Inc.

CAPABILITY CAD/CAM Graphics is an engineering design group specializing in computer aided graphics design and artwork generation for printed circuit boards and/or hybrid microcircuits. They also offer consulting services to assist clients in the development of design standards/criteria to suit their special needs. Their product services include: (1) Design from schematic to layout, (2) Photoplotting of the following artwork masters: component and solder side, drill graphics, solder resist mask, silk screen, and assembly, (3) Numerical control drill tapes to suit either Excellon or Digital Systems format, (4) Documentation packages and (5) Prototype and production quantities of printed circuit boards.

AVERAGE WORK FORCE: Total - 12

GROSS SALES: 1988 - \$2.4M
1989 - \$3.2M

EQUIPMENT: The equipments presently in use at CAD/CAM are (1) RACAL REDAC color Maxi, Cadstar, Pcad personal computer

systems, (2) GERBER 4432 Photoplotter (off-line), (3) Kodak film processing laboratory, and (4) CAD/CAM Graphics also is capable of providing Calma back-up to customers who wish to turn down their Calma installation but retain access to their Calma data base.

PLANT SIZE: 5,000 sq ft

EXPERIENCE: CAD/CAM has contract experience with various departments of the Canadian Government, including the Departments of National Defence and Transportation. Canadian industrial experience includes such companies as Northern Telecom, Bell Northern Research, Litton Systems, and AES Data Ltd. US industrial experience includes ITT Aerospace and IBM.

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CADEX ELECTRONICS Inc

ADDRESS: 7418 Sixth Street
Burnaby, British Columbia
Canada V3N 3L6

CONTACT: Mr Isidor Buchmann, President
Tel: (604) 522-8046
Fax: (604) 522-1867

KEYWORDS. Battery Chargers (Intelligent), Battery Analyzers.

HISTORY. Cadex Electronics Inc (CADEX) is a privately-owned, Canadian, electronic company founded in 1985. Prior to April 1985, the company was called Buchmann Enterprises Inc (BEI). BEI had been manufacturing battery analyzers since 1981. The name change was for marketing purposes only.

CAPABILITY. CADEX is primarily involved in the design and manufacture of industrial battery chargers and analyzers. Their product is of advanced design, using latest in microprocessor technology.

The CADEX chargers are primarily made for original equipment manufacturers. Present users include Mobile Data International (MDI) now a Motorola company, and Dynamic Sciences Limited (DSL). The DSL units charge the batteries for the end-of-train units of caboose-less trains.

CADEX's main activity is in manufacturing battery analyzers. Smart analyzers have become a vital tool in assuring confidence in rechargeable batteries and in eliminating excessive replacement costs incurred by premature battery failures.

After several years of use, it has been found that CADEX analyzers typically add one year to the life of a NiCd battery. In addition, operational efficiency is increased by 70% and the number of repairs cut in half.

CADEX manufactures two basic models. The CADEX C2000 maintains a fleet of up to 100 batteries. This stand-alone unit exercises, primes, and reconditions batteries automatically. Up to four different battery types can be serviced simultaneously.

For higher-volume battery users, the CADEX C6000 series is most economical. This modular system allows future expansion and supports virtually any battery type. Powerful options, such as battery report printing, computer interface, and bar code reader simplify record keeping and reduce operator time.

In the past, analyzers have primarily been used for portable radio batteries. Presently, the company is entering new markets, such as avionics. Their analyzers are capable of servicing small, airborne batteries as well as the main battery of a DC10. Other markets serviced by CADEX analyzers include applications for broadcast, bio-medical, industrial hygiene, survey, mining and military.

AVERAGE WORK FORCE. 11

GROSS SALES: 1988 - \$700K
1989 - \$900K

PLANT SIZE: 2,500 sq ft

EQUIPMENT. Most of the design work is done on personal computers, such as IBM-compatible AT models. Smaller computers, such as Apple II, are used for emulation.

EXPERIENCE. Present customers include various departments in the Canadian and US Governments, as well as industries in Canada, US, Europe and the Pacific Rim.

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CAE INDUSTRIES Ltd

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PO Box 1800
Saint Laurent, Quebec
Canada H4L 4X4

CONTACT: Mr John W Paterson, Manager, Public Relations
Tel: (514) 341-6780
Fax: (514) 341-7699

KEYWORDS: ATC Simulators; ATC; Avionics; Computer Graphics; Computers; Control Systems; Data Acquisition; Data Control Systems; Flight Simulators, Graphics, Hydraulics, Magnetic Anomaly Detection, Magnetometers, Nuclear Simulation, PC Board Design & Fabrication, R&O (Avionics), Radar, Radar Simulation, Real Time Control Systems, Real Time Graphics, Real Time Monitor Systems, Simulation, Simulation Programs, Simulators, Software Development, Software Services, Sonar Training Systems, Space Systems, Tactical Training Systems, Tactical Team Trainers, Training, Training Simulators, Video Display Systems

HISTORY The company was incorporated in 1947 as Canadian Aviation Electronics Ltd to engage principally in the repair and overhaul of electronics and electro-mechanical equipment and devices. The name was changed to CAE Industries Ltd in 1963 to more accurately reflect its expanding interests in many diverse fields of industry. Diversification and acquisition began in 1961 with the formation of CAE Electronics GmbH in West Germany. In 1988, CAE formed CAE-Link Corporation following acquisition of Link Domestic Simulation and Training Systems Division, the leading supplier of military simulation systems and training services to the US Army, Navy, and Air Force, and NASA. CAE-Link Corporation is comprised of three divisions: Link Flight Simulation, Link Tactical Simulation, and Link Training Services. Other subsidiaries are all Canadian based and include CAE Electronics Ltd, Northwest Industries Ltd, CAE Fiberglass Ltd, Canadian Bronze Company Ltd, CAE Machinery Ltd, and USP Industries Inc. This profile will concentrate on CAE Electronics Ltd

CAPABILITY: CAE Electronics Ltd designs and manufactures sophisticated commercial and military aircraft flight simulators and airborne magnetic anomaly detection equipment. They have also become a major producer of computer based data acquisition and control systems in the areas of electrical power generation and transmission, marine propulsion, air traffic control, and space.

In the simulator area, they are a leading designer and producer of flight simulators. They have produced the first FAA approved, phase III commercial aircraft simulator for United Airlines. Their simulators include state-of-the-art technology such as digital six-degree of freedom motion systems, digital control loading systems and digital sound systems. CAE simulators reproduce aircraft performance in all flight regimes and, in particular, the critical landing phase. Flight simulators have been developed for the A-300, A310, A320, B727, B737, B747, B757, B767, DC-8, DC-9, DC 10, MD 80, MD11, L1011, ATR42, Saab 340, Fokker F-28, Fokker F-50, Fokker F-100, CL-600, and Citation 500. A wide range of simulators has also been supplied to different countries for various types of military aircraft, including tactical jet fighters, jet trainers, anti submarine patrol aircraft, transports, and helicopters.

CAE produced a crew station research and development facility (CSRDF) for the US Army which is used to evaluate crew and cockpit configurations for helicopter designs, such as the Army's LHX. In addition to flight simulators, CAE produces training simulators for nuclear power plants. They are used to train operators to develop experience in responding to all normal, abnormal, and emergency conditions as well

as to learn required operating procedures and techniques. In the avionics area, CAE develops and manufactures magnetic anomaly detection (MAD) systems used in antisubmarine warfare. Their cesium magnetometer system, which has been traditionally mounted in a stinger at the rear of the aircraft, can measure changes in the earth's magnetic field as small as one part in 5 million. The company now offers an integrated MAD system for inboard use on fixed wing aircraft and helicopters.

They have developed a "JETS" joint enroute/terminal data processing and display system and an oceanic flight data processing system (OFDPS) for air traffic control. Both systems are modular and the displayed information is tailorable to user requirements. They are active in the space area having supplied the remote manipulator system for the NASA Space Shuttle. They are currently involved on space station producing simulation software and man-machine interface equipment. The company is also working on the European space program under contract to the European Space Agency (ESA).

AVERAGE WORK FORCE: Total (CAE Electronics) - 3,500
Technical Staff - 1,750

GROSS SALES: No data.

PLANT SIZE: 605,250 sq ft

EXPERIENCE. CAE Electronics customers include defense forces from more than 20 nations, the world's major airlines, aircraft manufacturers, training institutes, and government agencies. Current R&D activities include working with the USAF (AFHRL) on a joint program-design project for the development of a wide field of view, helmet-mounted, infinity display system, incorporating area of interest high resolution imagery slaved to the pilot's eye movements, development of the interactive graphics environment for real time systems (TIGERS) and a computer assisted training system (CATS), and CAE is currently developing a simulator complexity test bed for the US Army - this equipment will be used to evaluate what type of simulator is required to obtain a specific level of training transfer and will be used for aircraft development as well.

REVISED: Apr 90

CALIAN COMMUNICATIONS SYSTEMS Ltd

ADDRESS: 300 Legget Drive
Kanata, Ontario
Canada K2K 1Y5

CONTACT: Mr Terry Black, Executive Vice President and General Manager
Tel: (613) 592-3020
Fax: (613) 592-3378

KEYWORDS. Adaptive Receivers, Automated Monitoring & Control, Build To-Print, Communications, Communications Simulators, Data Acquisition, Data Processing, Digital Communications, Digital Modems, Electronic Warfare; Ground Stations; HF Adaptive Antenna Arrays; HF Communications, HF Modems, Jamming, Modems, R&O (Electronics), Radio Communications, Satellite Carrier Monitoring, Satellite Communications, Signal Identification Systems, Signal Processing, Spectrum Analysis, Spectrum Management, Spread Spectrum Modems, Synthesizers, Systems Design, Telecommunications, Terminals, Test Instrumentation, Testing/Test Equipment, UHF & S-Band Telemetry Trans, Voice Privacy Communications.

HISTORY. Calian Communications Systems (CCS) is a wholly Canadian-owned company founded in 1974 with no US subsidiaries. It is primarily a systems engineering company specializing in the planning, design, and implementation of a wide range of communication systems.

CAPABILITY: CCS designs and manufactures advanced communications systems and equipment for both military and commercial applications. The company is structured into complementary divisions as follows:

- The Advanced Space Systems Engineering Group performs design studies, analyses, and simulations, principally in the fields

of space communications. Custom software and hardware is also developed to the level of full-scale prototype to prove concepts and demonstrate performance. Particular expertise exists in digital modulation and coding, spread spectrum techniques, channel modelling and propagation analysis, emitter location and identification, spectrum analyzing receivers, fixed/mobile satellite system design, satellite navigation and positioning, and interference effects analysis.

- The Product Engineering Group produces computer-controlled instrumentation for communications monitoring, research, and simulation. Defense-related products include a communications ECM simulator, which allows the evaluation of communications systems performance under jamming conditions, and an adaptive antenna array processor, which automatically synthesizes appropriate antenna patterns to reject interference and jamming. Products with both commercial and military applications include systems for spectrum surveillance, satellite monitoring, and satellite-mobile propagation simulation. In addition, the group produces data downlink systems designed to transmit high-speed information such as digitized SLAR radar video in real time from an aircraft to a ship or ground station. Radar images from the aircraft can be received, stored, and reproduced in hard copy form on board the ship. Applications for the system include coastal surveillance and ice reconnaissance. Related data downlink system products include a high resolution airborne data acquisition system which permits video information such as SLAR and SAR to be stored on a 9-track tape recorder for off-line processing and an aircraft motion compensation system which corrects aircraft imagery for yaw and drift angle motion.

AVERAGE WORK FORCE Engineers/Computer Scientists - 16
Total - 26

GROSS SALES: 1988 - \$2.5M
1989 - \$3.2M

PLANT SIZE: CCS is housed in a modern 15,000 sq ft plant (expandable to 40,000 sq ft on current site). The plant is well equipped with a variety of computers, test equipment, and production equipment.

REVISED: Mar 90

CAMETOID Ltd

ADDRESS: 1449 Hopkins Street
Whitby, Ontario
Canada L1N 2C2

CONTACT: Mr D G Newman, President and General Manager
Tel: (416) 666-3400
Fax: (416) 666-3413

KEYWORDS: Anodizing; Chemical Films; Coatings; Coatings (Optical); Conductivity Testing; Dry Film Lubricants; Electroplating; Hardness Testing; Hydrogen Embrittlement; Ion Plating; Ion Vapor Deposition; Ivadizing(tm); Materials Processing; Metal Coatings; Metal Finishing; Multi-Layer Coatings; Optical Coatings; Protective Coatings, R&O (Coatings); Salt Spray (Fog) Testing; Stress Relieving; Surface Finishing; Taber Abrasion Testing; Teflon(tm) Coatings; Thickness Testing; Vacuum Coatings.

HISTORY Cametoid was incorporated in 1950 and was originally owned by Dowty Equipment of Canada Ltd. In 1968, it was acquired by the Newman family of Whitby, Ontario, and is today a wholly-owned subsidiary of Newman Aerospace Inc, a Canadian company.

In 1988, Newman Aerospace incorporated Cametoid Technologies Inc of Manchester, Connecticut, to acquire assets of Chromalloy Technical Services, a division of Chromalloy Gas Turbine. Cametoid Technologies Inc in Manchester, Connecticut, has facilities for ion vapor deposition of aluminum (Ivadizing) in chambers similar to those at Cametoid Ltd. Additionally, this company has facilities for specialized spray coatings including epoxy and metal-rich paints.

CAPABILITY. Cametoid has three divisions.

- The Chemical Coatings Division - established in 1950, produces specification anodizing (chromic, sulfuric, and hard), electroplating (cadmium, copper, nickel, nickel-cadmium, silver, tin and zinc), electroless nickel, chemical films on aluminum and magnesium, phosphates on steel, passivation of stainless steel, dry film lubricants of moly disulfide, and Dupont teflontm sprayed coatings.

- The Vacuum Coatings Division - established in 1981, is one of the few facilities in the world capable of ion vapor deposition of aluminum (Ivadizingtm) on large parts (narrow parts up to 14 ft long, and flat parts 5 ft x 10 ft), as well as on small parts like aircraft fasteners and round and square connectors.

- The Optical Technologies Division - established in 1984, specializes in the design, production, and testing of optical coatings intended primarily for infrared applications. Development is also proceeding on the establishment of facilities for the manufacture of optical components and the production of optical materials.

AVERAGE WORK FORCE. 30 to 40 persons with 8 to 10 professionals (Canadian facility)

GROSS SALES: \$2.0 - \$5.0M (Annually - Canadian facility)

PLANT SIZE: 30,000 sq ft (Canadian Facility)

EQUIPMENT. Cametoid provides complete chemical, electro-chemical, and vacuum-coating facilities; baking ovens; exhaust systems; and an in-house water treatment plant. Optical coaters include four-pocket e-beam gun and laser-monitored deposition controller. Two laboratories, one for process control and one for research and development, are also available with suitable test equipment. Strategic production and test facilities are computer-controlled.

EXPERIENCE. Cametoid has more than 35 years of active subcontract experience in dealing with the aerospace, electronic, nuclear, and general defense industries in Canada and the US. It is recognized as a "special process" facility by both the Department of National Defence and the Department of Transport Canada. It maintains approvals with its principal customers including Air Canada, Andrew Antenna, Invar Manufacturing, Bell Aerospace, Bell Helicopter, Boeing, CAE Electronics, Canadair, General Electric Canada, Cleveland Pneumatic, Computing Devices, Devtek, Dowty, Fleet, Garrett, Grumman, Hawker Siddeley, Indal, ITT Cannon, Kaman Aerospace, Litton, Martin Marietta, McDonnell Douglas, Menasco, MBB, Pratt and Whitney, Raytheon, Sikorsky, Spar, Unisys, and Wabco.

In addition, the company serves a number of precision machine shops related to the aerospace industry in the Toronto, Ottawa and Montreal regions.

REVISED: May 90

CANAC TELECOM

ADDRESS. 151 Front Street, Suite 514
Toronto, Ontario
Canada M5J 2N1

CONTACT Mr Andre B Poliszuk, Director, Marketing North America
Tel: (416) 860-2890
Fax: (416) 365-9227

KEYWORDS: Telecommunications; Secure Communications; Microwave Satellite, UHF Radio, VHF Radio, Fiber Optic Cable Systems, Copper Cable Systems, Coaxial Cable Systems, Systems Integration, O&M (Telecommunications), Information Systems, Computer Systems Design, Telephone Billings Systems.

HISTORY. CANAC Telecom was organized in 1983 as a business unit of Canadian National Communications (CNC), a division of Canadian National Railways (CN), a Canadian Crown Company.

The company provides turnkey project management and computer systems integration in the fields of public, commercial, specialized, and military telecommunications systems since 1946. In addition to telecommunications, CANAC Telecom/CN Communications has developed its data processing and information systems since the early 70s, providing telephone billing systems for the two telephone companies and commercial software sale.

The company was established in 1922 when Canadian National was formed as a Crown Corporation with the mandate to provide transportation and commercial telecommunications services in Canada.

CAPABILITY. CANAC Telecom is a telecommunications and computer systems integrator with available resources of CN's 43,000 employees, \$6.9B assets, and \$4.7B revenues.

Providing a single point of responsibility for complex turnkey commercial, secure, and military systems requiring specialized engineering and software expertise ensures our customers a successful system integration.

CANAC Telecom has experience in providing analog and digital telecommunication transmission and switching systems. The transmission systems encompass cable (standard copper, coaxial, and fiber optic), satellite, microwave, troposcatter, and other radio-based systems. The computer systems involve the integration of hardware and software technologies such as relational database management system, fourth generation languages, structure analysis and design, computer-aided software engineering, and distributed processing.

Along with these systems, CANAC Telecom offers a broad range of services required for the smooth integration, installation, and implementation of a system. These services include timely and cost-effective feasibility studies, engineering design, procurement, installation, training, and operation and maintenance expertise.

AVERAGE WORK FORCE: Engineers & Technical Specialists – 9
Systems Analysts – 5
Hardware and Network Design – 7
Software Engineers – 7
Computer Integration – 5
ILS & Configuration Management – 7
Operations & Management Specialists – 24
Training & Education Specialists – 7
Financial Specialists – 8
Others – 10

GROSS SALES: 1989 – \$151.2M

PLANT SIZE: No data.

EQUIPMENT: No data.

EXPERIENCE: Customers include The Ministry of External Affairs who awarded CANAC Telecom, a partner in the SICOM group, the Canadian On-Line Secure Information Communication System project on August 1988 and the Chancery Alarm Reporting System project on February 1989.

The Republic of Botswana, in association with the African Development Bank, awarded CANAC Telecom the rural telecommunications network for Botswana project on December 1988. CANAC Telecom is currently integrating, installing, operating, and maintaining the communication segment for the North Warning System for the Canadian Armed Forces in addition to providing further system enhancements awarded in 1989.

Past customers have included the USAF for operation and maintenance of the troposcatter system for the DEW line, Thailand Ministry of Communications, Asian Development Bank, and Chinese Ministry of Railways.

REVISED: Mar 90

CANADA FORGINGS Inc

ADDRESS: PO Box 308
130 Hagar Street
Welland, Ontario
Canada L3B 5P8

CONTACT: Mr N F Carpentier, President
Tel: (416) 735-1220
Fax: (416) 735-6992

KEYWORDS: Forgings, Specialty Forgings, Machining, Non-Destructive Testing.

HISTORY: Canada Forgings Inc is a Canadian-owned, custom-forging producer founded in 1912. It is now a subsidiary of Toromont Industries Ltd. The company operates two plants on 8 1/2 acres of land in Welland, one for closed die forgings and the other for open die forgings.

CAPABILITY. The closed die plant occupies 60,000 sq ft of production space and is equipped with air hammers to 10,000 lbs supported by appropriate heat treating, cleaning, and quality assurance facilities. There is capability for forging products up to 200 lbs in weight along with a machine shop equipped with die sinking equipment.

The open die plant occupies 117,000 sq ft under roof, and it houses Canada's only seamless ring rolling facilities. This plant operates Ontario's largest open die hydraulic forging press (3300 tons), two other open die presses of 1200 and 600 ton capacity respectively, hammers, heat treating furnaces, full machine shop, and complete non-destructive testing facilities.

Canada Forgings employs a mature quality control system meeting military, nuclear, and aerospace requirements and a number of qualified and experienced personnel to handle customers metallurgical, NDE, and quality requests.

Our management information services are fully computerized and extend into all areas of the operation including estimating, inventory control, order processing, accounting, and cost controls.

AVERAGE WORK FORCE: 160

GROSS SALES: \$18-25M Average Annual Sales

PLANT SIZE: 177,000 sq ft

EQUIPMENT: See discussion under **CAPABILITY** above.

EXPERIENCE: Canada Forgings produces high-quality, specialty forgings for the most demanding and sophisticated engineering applications: jet engines, nuclear reactors, power generation, energy exploration, pipeline, off-road transportation, mass transit, and ground defence. A list of our customers features such companies as Pratt & Whitney, General Dynamics, Garrett, Avco Lycoming, Bell Helicopter, General Electric, Westinghouse, South West Engineering, Marine Industries, Linimar Machine Ltd, etc.

REVISED: Mar 90

CANADAIR GROUP (Bombardier Inc)

ADDRESS: 1800 Laurentien Blvd
St Laurent, Quebec
Canada H4R 1K2

Mailing Address
PO Box 6087, Station A
Montreal, Quebec
Canada H3C 3G9

CONTACT: Mr John F Smith, Vice President and Assistant to the President
Tel: (514) 744-1511
Fax: (514) 744-6586

KEYWORDS: Aerodynamics; Aircraft; Airframe Components; Airframe Structures; Castings; Coatings; Components (Airframe); Composite Components; Computational Design; Extended Length Machining; Flutter Analysis; Forgings; Fracture Analysis; Heat Treating; Machining; Metalworking, RPV; Software Services, Testing/Test Equipment.

HISTORY. Canadair was originally incorporated in late 1944 and is a wholly-owned subsidiary of Bombardier Inc. The company has a fully-owned subsidiary, Canadair Challenger Inc, in Windsor, Connecticut, and Challenger Service Centers in Hartford, Connecticut, Los Angeles, California, and Obenpaffenhofen, West Germany. Mr Doug Marshall, Vice President for Government Relations is in charge of a Government Liaison Office in Ottawa, Ontario, (613) 233-9366.

CAPABILITY: Canadair has a high-technology R&D capability specializing in aerodynamics, flutter analysis, composite materials, remotely piloted vehicles, fracture analysis, and computational design techniques. Their product line includes

- Challenger business jet aircraft
- RJ regional jet airliners
- CL-215 multi-purpose amphibious aircraft
- CL-89, CL-227, and CL-289 unmanned airborne surveillance systems.

They have active subcontract work on the Boeing 767, Lockheed CP-140 and P-3C; McDonnell Douglas F/A-18A and F-15; Northrop F-5, CF-5, and T-38; and Aerospatiale and BAe A330/340 and A320/321. They specialize in machining to close tolerances (0.001 inch) with a high degree of repeatability. They have an integrated heat treating and stretch-forming system capable of treating and forming aluminum alloy sheets 40 ft x 8 ft x 0.375 in.

Their CL-89 (AN/USD-501) Airborne Surveillance System (unmanned) was designed for use at the Army division level. It is fitted with either a photographic or infrared line scanning sensor and is reusable. It is launched from a mobile zero-length launcher and recovered with a two-stage parachute system employing inflatable air bags to absorb landing shocks. This drone is stocked in the arsenals of the UK, West Germany, France, and Italy.

The CL-289 (AN/USD-502) is a longer range updated version developed jointly with Dornier GmbH of West Germany. This new vehicle carries both a photographic sensor and an infrared line scan (IRLS) sensor and covers a 150 kilometer range at speeds in excess of 700 kph. A real-time data transmission link is associated with the IRLS System. On-board computers carry the flight instructions for both the CL-89 and CL-289. Production of the CL-289 for the armies of West Germany and France is underway.

The third model, CL-227, is an hourglass-shaped, remotely piloted vehicle, and is now in the full scale engineering development stage. It is designed as a highly survivable surveillance and target acquisition system for use at medium range. It has VTOL capability and is launched and recovered from a mobile two-meter diameter platform. It can transmit real-time data.

AVERAGE WORK FORCE: 6850

GROSS SALES: 1988 - \$624M
1989 - \$764M

PLANT SIZE: 3,145,000 sq ft

EQUIPMENT. Their special equipment includes.

- Six Cincinnati profilers modified to CNC control, 5-axes; each bed 212 ft long, 13 ft 4 in wide. Each bed has 3 gantries with 3 spindles each.
- Two Cincinnati profilers. CNC, 5-axes on a 120 ft long bed, 15 ft 3 in wide that have 2 gantries with 3 spindles each
- One Ingersoll profiler: numerically-controlled; 3 axis; Bed 96 ft long, 17 ft 5 in wide; single gantry with 3 spindles.
- Nine Wilson profilers: tracer-controlled; 3 axes: some 6 spindle, some 4 spindle.
- Several CNC Kearney and Trecker 3, 4, and 5 axes profilers.

- Three autoclaves. one 15 ft dia, one 12 ft dia, for metal-to-metal, honeycomb, and composite bonding.

- Heat-treat, stretch forming system. Electrically-heated furnace takes sheets 40 ft by 8 ft. 1000-ton stretch press takes sheets 50 ft by 8 ft and 1/2 in thick.

- Gerber drafting machine: computer controlled with a working surface of 5 ft x 22 ft.

EXPERIENCE. The Canadair experience over the past four years includes subcontracts for components for the Lockheed P-3C and CP-140, rear fuselage sections for Boeing 747SP and 767, components for the McDonnell Douglas F-15 and F/A-18A, shipsets of components for the Lockheed C-5B, and shipsets of components for BAe and Aerospatiale for the A330/340 aircraft. Current products include Challenger business jet, CL-215 multipurpose amphibian, three surveillance systems, and subcontracts.

REVISED: Mar 90

CANADIAN AIRMOTIVE Inc

ADDRESS: 407 - 594 No 6 Road
Richmond, British Columbia
Canada V6V 1Z1

CONTACT: Don Arney, President
Tel: (604) 270-0188
Fax: (604) 270-6048

KEYWORDS Aircraft Engines, Engines (Aircraft), Turbocharged Piston Aircraft Engines, Liquid Cooled Aircraft Engines, Lightweight Aircraft Engines, Four-stroke Aircraft Engines

HISTORY: Canadian Airmotive Inc was incorporated in August 1989 to complete the development of a 993 cc, four stroke, 3-cylinder turbocharged aircraft engine generating 97 hp with a dry weight of 150 pounds. This engine will be in production by July 1990 and will be followed by four-cylinder versions to 178 hp

CAPABILITY Canadian Airmotive Inc is an affiliate of Full Lotus Manufacturing Inc. Its mandate is the design and production of modern, very lightweight, turbocharged engines for homebuilt aircraft. Certified versions of these engines are anticipated in the future.

Three carburetted engines will be initially available. 993 cc, 3-cylinder at 97 hp, 1300 cc, 4-cylinder at 125 hp, and 1600 cc, 4-cylinder at 155 hp. Fuel injected and intercooled variants will follow at 111, 143, and 178 hp respectively. All of these engines offer power at altitude and a very high power-to-weight ratio because of the turbocharger, and because of the small displacement, they offer exceptional fuel economy.

AVERAGE WORK FORCE: 15

GROSS SALES: No data.

PLANT SIZE: 3,000 sq ft

EQUIPMENT Complete machine shop including lathe, milling machine, Tip welder, hydraulic press, electronic RF welding equipment, in-house computer systems.

EXPERIENCE: Development and marketing by the same personnel as Full Lotus Manufacturing whose products are used by pilots in recreational and commercial operations on all five continents

REVISED: Mar 90

CANADIAN ASTRONAUTICS Ltd

ADDRESS: 1050 Morrison Dr
Ottawa, Ontario
Canada K2H 8K7

CONTACT: Mr Chuck Thigpen, Director, Marketing
Tel: (613) 820-8280
Fax: (613) 820-8796

KEYWORDS: Antennas, Battery Management Systems, Satellite Communications, Computers, Data Reduction, Electro-Optics, Electro-mechanical Design, ECM, Electronic Warfare, Environmental Testing, Satellite Ground Stations, Image Processing, Navigation, Phased Array, Planar Array, Power Converters, RF Subsystems, Radar, Remote Sensing, SAR, Satellite Electronics, Search & Rescue Equipment, Side-Looking Airborne Radar, Signal Processing, Simulators (EW), Software Services, Space Based Radar, Space Systems, Structural Analysis, Structural Design, Synthetic Aperture Radar, Systems Studies, Tactical Signal Simulator, Test Rigs, Testing/Test Equipment, Ultra Violet Imagers.

HISTORY: Canadian Astronautics is a rapidly growing, wholly-owned, Canadian company incorporated in 1974. There are no Canadian divisions and no US subsidiaries.

CAL is primarily a systems level contractor with interests in four principal business areas - Space Systems, Radar and Communications Systems, Advanced Systems, and Defense Electronics. In addition to these development and manufacturing activities, the company performs engineering design/study work in all four areas.

CAPABILITY: As previously mentioned, Canadian Astronautics is divided into four business areas with capabilities as follows:

- Space Systems - CAL has an excellent capability in development and manufacture of spacecraft equipment and subsystems. Particular examples include antennas, RF subsystems, electro-optical equipment, battery management systems (NiCd and NiH₂), and power converters (high voltage and high efficiency).
- Radar and Communications Systems - CAL designs and manufactures airborne SAR and SLAR equipment and has a development capability for radar of all types, particularly those involving complex signal processing. CAL additionally has capabilities in phased arrays, having developed airborne planar arrays and MLS ground antennas. CAL is currently designing mobile earth terminals for terrestrial and aeronautical applications.
- Defense Electronics - EW and advanced military communications are the main activities of this division. In EW, the company has developed the Tactical Signal Simulator (TASS), which is a fully programmable dynamic scenario simulator for ESM receiver evaluation and operator training. Technology developments include fast tuning millimeter wave VCOs for ECM and simulator applications. In MILCOM, CAL has designed and built a Spread Spectrum Radio Simulator which generates a multiplicity of voice/data spread spectrum RF signals.
- Advanced Systems - The main activity of this division is the supply of search and rescue satellite (SARSAT) ground stations. CAL provides a full capability station including processing channels for 121.5, 243, 406 MHz, capable of remote/unattended fully automatic operation. Other activities include custom software development, typically for real time signal or data processing applications. Experience is available in many high level languages, including Ada, and CAL has the capability to develop software to MIL-SPEC-1679. The Advanced Systems Group also performs acoustic studies for anti-submarine warfare (ASW) applications.

AVERAGE WORK FORCE: Scientists & Engineers - 260
Others - 90

GROSS SALES: 1989 - \$30.0M

PLANT SIZE: 60,000 sq ft building complex which includes corporate offices, clean rooms, development laboratories, antenna range, military secure area with TEMPEST shielded room, and CAD facility.

30,000 sq ft manufacturing facility includes inventory controlled stores and production equipment.

EXPERIENCE: CAL has developed an excellent reputation for performing challenging programs in a professional, reliable manner. The company's

record with respect to schedule and budgets is excellent. Contracts are typically divided between the Canadian Government (60%), NASA (20%), and others (20%). Canadian Government departments include Communications; National Defence; Environment; Energy, Mines, and Resources, and National Research Council. Private customers include Telesat Canada, Atomic Energy of Canada, Marconi Space and Defense Systems (UK), MEL (Phillips, UK), European Space Agency, Intelsat, Bell Canada, and others. CAL has no direct contracts with the USAF, but is heavily involved via the SARSAT program and space based radar. One of the four SARSAT ground stations provided to NASA is located at Scott AFB, Illinois. CAL has supplied EW equipment to the US Naval Air Test Center. CAL can perform to military specifications.

REVISED: Apr 90

CANADIAN HELICOPTERS Ltd

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Richmond, British Columbia
Canada V6V 1W1

CONTACT: Mr Michael Druet, Manager Technical Sales
Tel: (604) 276-7524
Fax: (604) 270-6822

KEYWORDS: R&O (Engines); R&O (Engine Components); R&O (Components), R&O (Accessories), R&O (Hydraulics), R&O (Avionics), Modification (Helicopters), R&O (Helicopters), Helicopter Operations, Helicopter Modifications.

HISTORY: Canadian Helicopters Limited is a Canadian-owned company formed in 1987 with the amalgamation of Okanagan Helicopters, Sealand Helicopters, Toronto Helicopters, Ranger Helicopters, Offshore Helicopter Technologies Limited, and Aero Flight Holdings Limited. Canadian Helicopters' Engineering Support Division originated with Okanagan Helicopters Ltd, which was established in 1947 by company founder, Carl Agar. Canadian Helicopters is the largest helicopter operator in Canada and one of the two largest in the world.

CAPABILITY: Canadian Helicopters is primarily involved in the inventory and engineering support of its fleet of over 250 aircraft in addition to supporting over 200 customers worldwide. Within the engineering support operations are an engine shop, a component shop, an accessory shop, an avionics/instrument shop, an engineering design department, and a materials control group which is responsible for a \$43 million inventory. The company is fully authorized to support and service General Electric CT58/T58, Detroit Diesel Allison 250 series, and Pratt & Whitney PT6T aircraft engines, as well as repair, overhaul, and supply parts for components, accessories, hydraulics, avionics, and instruments on the following aircraft models: Bell 204, 205, 203 (A, B, B111, L11), 212, 214(ST), Sikorsky S76 (A, B), S61 (L, N), and Aerospatiale AS350 (B, D), AS355F-1.

AVERAGE WORK FORCE: Pilots - 301
Engineers - 330
Technicians - 90
Other - 475

GROSS SALES: 1988 - \$118M
1989 - \$160M

PLANT SIZE: 55,000 sq ft

EQUIPMENT: Company equipment includes twin cell engine test facility; state-of-the-art equipment for cleaning, non-destructive testing, precision balancing, machining, and coordinate measuring; computerized carousel inventory storage system, and all equipment necessary to overhaul aircraft components.

EXPERIENCE: Canadian Helicopters' present customers include various departments in the Canadian Government such as Canadian Coast Guard (Victoria, Prince Rupert, and Hovercraft), RCMP, and DND as well as Pemex, Greenlandair, British International Helicopters, Trump Air, and others.

REVISED: Apr 90

CANADIAN MARCONI COMPANY

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Montreal, Quebec
Canada H3P 1Y9

CONTACT: Mr A M Bell, Manager, Business Development
& Programs (Mr Bell is physically located in
Kanata, Ontario.)
Tel: (613) 592-7436
Fax: (613) 592-7427

KEYWORDS. Adapters, Aircraft Satellite Communications Antenna, Avionics, Calibration, Circuit Packaging, Cockpit Displays, Communications, Components, DME, Data Communications, Digital Order Wire, Displays; Doppler Navigation Systems; ECCM Antenna; ECCM Radio; Engine Instruments, EW Systems & Equipment, Hybrid Circuits, ILS, Illuminated Panels, Image Processing, Infrared Systems, Injection Molding, Instrument Repair, Integrated Logistics Support, Intelligent Instruments, Inventory Control Systems; Landing Aids; Lighted Panels; Line Terminating Unit, MLS, Machining, Magnetic Devices, Microcircuits, Multiplexer, Navigation, Navigation Aids, Navstar GPS, Omega Navigation Systems, PC Board Design & Fabrication, Photoplatting, Power Supplies, Precision Manufacturing, R&O (Avionics, Communications, Electronics), Radar, Radio Ancillaries, Radio Communications, Radio Wire Integrator, Space Electronics, Surveillance, Tactical Radio Relay, Tactical Switchboards, Testing/Test Equipment, Thick Film Hybrid Microcircuits, Thin Film Hybrid Microcircuits; Transformers; VOR; Welding.

HISTORY. Canadian Marconi Company (CMC) is a public company incorporated in Canada in 1903 as the Marconi Wireless Telegraph Company of Canada. The change to its current name occurred in 1925. The General Electric Company, p.l.c. of London, England, holds 51% of CMC's shares, with the remainder being widely held in Canada and the US.

The company is organized into six more or less autonomous divisions, each performing in separate product and/or services areas. The divisions are Components and Commercial Communications, based almost entirely in Montreal, Avionics Division, based in Montreal but with a fairly large R&D and systems group in its Kanata facility, Naval and Ground Systems and Data Communications Products Divisions in Kanata, and Defence Communications Division, based in Montreal, but with a recently opened new facility in Cornwall, Ontario. CMC has two wholly-owned subsidiaries in the US, CMC Electronics Inc in Eatontown, NJ, and Cincinnati Electronics Corp (CEC) in Cincinnati, Ohio.

CAPABILITY. The divisional product areas are.

- Avionics Division – Navigation systems, monitoring and display instruments, and performance management products, also repair and overhaul of C&E equipment and calibration of electronic test equipment.
- Naval and Ground Systems Division – Ship surveillance, search and rescue, surface radar systems and related equipment, instrument and microwave landing systems (ILS+MLS), VOR, and DME.
- DataComm Products – Telex/data exchange systems and bidirectional telex to fax converters.
- Components Division – Multi-layer printed circuit boards, hybrid micro-circuits, illuminated panels, power supplies, precision machined parts, surface mount technology, and rigid-flex boards.
- Defence Communications Division (DCD) – Tactical communications equipment.
- CMC Electronics Inc – Support for marketing and sales of company products in the avionics, nav aids, and defense communications fields. Also provides full service for CMC Avionics equipment at its FAA-certified repair center.
- Cincinnati Electronics Corp – A long-established company in the USA which specializes in defense and space products, EW systems, integrated logistic support, and radar systems.

The company's military avionics products are used by the defense agencies of more than 20 countries. More than 5,000 Doppler navigation systems and velocity sensors have been supplied for use in rotary wing and fixed wing aircraft as well as drones. Commercial avionics is equally active. Airlines in 45 countries use CMC's navigation, monitoring, and display systems aboard more than 100 aircraft.

The company's digital, color-coded, vertical-scale engine instruments have set a standard for the aerospace industry. Performance of these instruments has led the US military to select them for use in the MOHAWK, APACHE, SEAHAWK, AHIP (OH-58D) and BLACKHAWK programs. Some CMC cockpit instrumentation has been designed to be compatible with specialized night-vision equipment. The reliability and accuracy of these engine instruments provide aircraft operators with precise measurements of all vital engine parameters.

The division has recently developed an airborne satellite communication (SATCOM) CMA-2100 antenna for use on civil and military aircraft such as 747, 707, MD-11, C130, and C141.

In addition to Doppler navigation and engine instruments, the Avionics Division produces Omega/VLF navigation systems. CMC started designing Omega navigation systems during the early 1970s. The company is now producing its third- and fourth-generation Omegas, the CMA-734/771 "Alpha" Omega, and the CMA-734 "Arrow", which uses an LCD display. The latest Omega development is the Omega/GPS combined system, CMA 764. Finally, the division designs and manufactures airborne MLS and CPS receivers.

The Avionics Division's expertise also includes calibration of precision test equipment, repair and overhaul of electronics systems, and field support of communications and detection installations.

The Naval and Ground Systems (NGS) Division manufactures ground-based MLS, and designs and manufactures ILS, DME, and VOR equipment.

CMC's most advanced radar system is the AN/SPS-503 surveillance system. Developed for the Canadian Destroyer Life Extension program (DELEX), it is now being marketed in various configurations to other countries of the world. The surveillance system is intended for fast patrol craft, frigates, and destroyers. The company's LN-66 family of radars is used extensively by the US Navy. More than 850 of the AN/SPS 59(V) configuration are aboard virtually all classes of US Navy vessels. The division's latest product is a full-color, raster scan display, the CMR-809.

Few companies in North America possess CMC's high technology ability for the production of printed circuit boards (including SMT and rigid-flex), hybrid microcircuits, and power supply systems. CMC's Components Division has built a strong base of competitive technology and superior human resources. In addition to supporting the other CMC divisions, the division boasts a strong sales base of international aerospace and defense companies.

In data communications, CMC's CMA-755 telex exchange now handles all of the UK's telex traffic originating from 11 major cities. The telex system uses new technology in low-speed data switching. This system is being marketed to other areas of the world with a need for this service. The division's latest product is a bidirectional fax-to-telex converter, the Transcriber 2020.

CMC's Defence Communications Division (DCD) is a world leader in design and supply of line-of-sight tactical radio, having supplied 8,000 sets to the US Army and 7,000 sets to 25 other countries. This radio, the AN/GRC-103(V), has recently been joined in US Army inventory by a multiplexer, the TD-1427, and two converter types, all contained in Radio Terminal Set AN/TRC-180(V), built specifically for the 9th Infantry Division Quick Reaction Program.

CMC's most recent contribution to US Army inventory is the AN/GRC-226(V), the exclusive line-of-sight radio set for the Mobile Subscriber Equipment program. Under contract to the US Army, DCD is currently developing a Digital UHF ECCM Radio, which is expected to be produced in large numbers in the 1990s.

On the telephone side, DCD has established a world reputation with the SB-4170/TT Switchboard and is now offering the Subscriber Access Radio Telephone (SART) which increases capabilities and flexibility in the combat radio networks.

Cincinnati Electronics Corp (CEC) was acquired by Canadian Marconi Company in September 1988. CEC has many distinguished "firsts" to its credit including the first integrated secure radio, the first transistorized military radio, and the first manpack satellite communications terminal. CEC is currently engaged in work on special communications projects such as MISTE and the PCI family of equipment. Designed with forward error correction and message authentication. The company is still involved with space launch range safety receivers, having provided range safety receivers for two-thirds of all US space launches in the last five years. CEC is the producer of the AN/AAR 34 Infrared Tail Warning Systems for the USAF and, in a joint program with Grumman, is updating the device 15E34A combat training simulator at Whidbey Island, Washington, which is used in simulated training for the EA-6B aircraft.

AVERAGE WORK FORCE: *Engineers - 267
*Technologists - 60
Others - 2533
Total - 2860

* These figures include only those (in Canada) actively engaged in R&D, it excludes management and production personnel

GROSS SALES: 1988 - \$107.3M
1989 - \$304.7M (includes CEC sales for the first time)

PLANT SIZE: 500,000 sq ft (Montreal)
200,000 sq ft (Kanata)
42,000 sq ft (Cornwall)
550,000 sq ft (Cincinnati)
21,360 sq ft (Eatontown/East Rutherford)

EQUIPMENT: CMC has a wide variety of specialized production and test equipment, including an anechoic antenna test range, automated test equipment, CMI/EMC testing to 2GHz, and environmental testing facilities to all major Mil. standards. In addition, complete facilities are available for component manufacture of specialized items, and assembly of electronic components and systems to customer design or specifications.

EXPERIENCE Canadian Marconi Company has provided systems, equipment, components, and services to every branch of the US DOD and the US Coast Guard over the past 25 years, meeting all military specifications satisfactorily. The products of CMC, military and commercial, are exported regularly to 94 countries worldwide. The company has been granted every Mil Spec available.

REVISED: Mar 90

CARR-SAWYER Inc

ADDRESS: Suite 501
2201 Finch Ave West
Weston, Ontario
Canada M9M 2Y9

CONTACT Mr Alan C Carr, President
Tel: (416) 741-4733

KEYWORDS: Consulting; Aircraft Analysis; Modification (Design & Supply); Stress Analysis; Studies; Accident Analysis; Robotics, Testing/Test Equipment; Frangible Towers.

HISTORY: Carr-Sawyer Inc (CSI) is a Canadian-owned high-technology aerospace consulting company founded in 1984. The company is wholly owned by its Directors: Alan C Carr, Richard N A Sawyer, and Haig Saadatian.

CAPABILITY: CSI's principal field of specialization is aerospace. Other fields of interest are ground transportation, nuclear, robotics, CAD/CAM/CAE and heavy industrial.

Capabilities offered by CSI are: Detailed aircraft design, (aerodynamics and stress analysis), design and approval of airframe modifications, design, analysis and manufacture of custom test rigs and equipment,

consulting services for 'finite element structural analysis', and consulting services for CAD/CAM/CAE.

CSI also markets specialty PC based software for structural analysis, CAD/CAM, fracture analysis, piping analysis, and heat transfer/thermal analysis.

CSI's typical projects include:

- Aerospace - Design, analysis, and airworthiness certification of a large radome and SAP antenna installation for Canadair CL600 Challenger, antenna and chaff cutter installations for EST Challenger aircraft, design of wing-mounted fuel tank for SKYVAN Aircraft (EMR); aerodynamic design and stress analysis for LW-SKAD wing-mounted stores, detail stress analysis of various components on DASH-7 and DASH-8 aircraft (deHavilland Aircraft of Canada); accident analysis including expert witness advice in court; design and manufacture (procurement) of test rigs for AN/SAR-8 Program including commissioning and project management (shipborne surveillance system for SPAR Aerospace), design, analysis and manufacture of vibration fixtures for ADATS components (Grantech); research & development of frangible towers for airport use; and design of containers & test equipment for ANIK-E Satellite.
- Transportation - Detail stress analysis of ORION I bus including field tests measurements - Ontario Bus Industries; and detail stress analysis of ORION II Bus - Ontario Bus Industries).
- Nuclear/Piping - Consulting services to review reports (Ontario Hydro), and detail analysis of piping system for a waste-re-cycling system (B & R Engineering).
- Robotics - Feasibility study and preliminary designs of a 5-axis router for cutting doors in airframe structures (deHavilland Aircraft of Canada).
- Heavy Industrial - Detail stress analysis of mine hoist and winch drums (John T Hepburn Co), and detail stress analysis of various press platens (John T Hepburn Co).

AVERAGE WORK FORCE: Professional Engineers - 6
Designers - 2
Others - 2

GROSS SALES: 1988 - \$732K
1989 - \$995K

PLANT SIZE: 2,000 sq ft (office space)

EQUIPMENT: Various microcomputers including IBMs, (2-286, 4-386 machines), CAD work station, and plotter (E size).

EXPERIENCE: CSI's present customers include various departments of the Canadian Government, but most of their business is with the private sector. Customers include SPAR Aerospace Ltd, Boeing Canada-deHavilland Division, Intera Technologies, Lockheed Canada, Fleet Industries, CAE Electronics Inc, John T Hepburn Ltd, Innotech Aviation Ltd, and Ontario Bus Industries.

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CASEY COPTER ACCESSORIES Ltd

ADDRESS: 511 Lepine
Dorval, Quebec
Canada H9P 2S9

CONTACT Mr M J Casey, Vice President
Tel: (514) 636-6155
Fax: (514) 636-4831

KEYWORDS: Air Conditioning (Aircraft), Aircraft Air Conditioning, Aircraft Heating, Electronic Controls, Heating (Aircraft), Motor Speed Control; Temperature Control.

HISTORY Casey Copter Accessories Ltd is subsidiary of Dynamic Air Engineering, Santa Ana, CA, founded in 1975 with no other Canadian divisions.

CAPABILITY: The major products of this company are heating and air-conditioning systems for both aircraft and helicopters. Other products are DC motor speed control devices and temperature controls.

The heating system is applicable to aircraft equipped with Allison 250 series or Pratt & Whitney PT6 series engines. The system is designed for maximum reliability with minimal moving parts. This passive heater system is based on the air-to-air heat exchanger principle, requiring minimal maintenance. Use of the heater system does not reduce range, restrict airspeed, nor reduce rate of climb because it does not require bleed air or fuel. The heater system will provide a cabin temperature of 15°C at an outside temperature of -40°C, a 30 pound weight saving over a combustion heater, and a high output.

The air-conditioning system is of the vapor cycle type with an engine driven compressor. System capacities are available up to 36,000 BTU per hour with current designs. Higher capacities may be developed to customer requirements as will drive systems and installations. The systems are designed to be compatible with Casey heater installations.

Motor speed controls have been designed to provide variable speed control for 28V DC motors in air moving applications and provide increased brush life as well as continuous or step-wise variable control. These units are customized for each application.

AVERAGE WORK FORCE: Engineers - 2
Inspection - 1
Others - 9

GROSS SALES: 1988 - \$600K
1989 - \$700K

PLANT SIZE: 6,000 sq ft

EXPERIENCE The Casey Heater System is currently being used by various departments of the Canadian Federal and Provincial Governments, governments of other countries, US State Governments, and in wide use with Army National Guards and the US Army (Alaska area). The air-conditioner is in early commercial introduction. Speed controls have been provided for military land vehicle installation and test stands. It is estimated that 60-70% of total sales are to the US (10% to the National Guards).

REVISED: Mar 90

CAYUGA AUTOMATIC MACHINING (1985) Ltd

ADDRESS: PO Box 339
Kohler Road
Cayuga, Ontario
Canada N0A 1E0

CONTACT: Bruce Thomson, President
Tel: (416) 772-5700
Fax: (416) 772-3233

KEYWORDS: Machining; Precision Machining; CNC Machining Milling; Turning; Components (Mechanical).

HISTORY Cayuga Automatic Machining was established in 1972 to service the electronics industry with high-precision component parts. The company is privately held and Canadian owned. It now also supplies companies in aerospace and defense.

CAPABILITY: Cayuga Automatic Machining is a CNC precision machining operation producing component parts to customer specification for the aerospace, defense, and electronics industries. The company manufactures close-tolerance, precision components requiring several

operations, in volumes from prototype to 10,000 units in various metals including stainless steel, brass, aluminum, copper, etc. Complex turning and milling operations are performed from 1/4" diameter up to 8" diameter using bar-feed or chucker.

AVERAGE WORK FORCE: 25

GROSS SALES: 1988 - \$1.0M
1989 - \$1.1M

PLANT SIZE: 10,000 sq ft

EQUIPMENT: CNC lathes and machining centers (2 and 3 axis)

EXPERIENCE. Present Canadian customers include Pratt & Whitney Canada, Spar Aerospace, Varian-Microwave Division, and Com Dev Ltd. Present US customers include Loral Defense Corp, Lucas Aerospace, M/A Com Omni Spectra, and Teledyne Mowrowave.

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CERCAST (Division of Howmet Ceraseal (Canada) Inc)

ADDRESS: 3905 Industrial Blvd
Montreal North, Quebec
Canada H1H 2Z2

CONTACT: Mr Dieter Rupp, Sales Manager
Tel: (514) 322-2371
Fax: (514) 322-1340

KEYWORDS: Castings; Investment Castings.

HISTORY Ceraseal Inc was incorporated in Montreal in 1959. It has since expanded to eight manufacturing plants. Ceraseal Inc (Georgetown, Ontario), Ceramet Inc (Bethlehem, PA), Cercon Casting Corp (Hillsboro, TX), Sigma Casting Corp (City of Industry, CA), Feinguss GmbH (West Germany), CIRAL SA (France), Microfusione De Aluminio, SA (Spain). In 1989 Ceraseal Inc became a division of Howmet Ceraseal (Canada) Inc.

CAPABILITY: Ceraseal is well known for its capabilities of producing large, complex, investment castings used primarily in the aerospace industry.

The company's quality control systems are approved by all major Canadian, US and European aerospace manufacturers and their in-house special processes include heat treating of aluminum alloys, radiographic inspections, penetrant inspections, chemical analysis, mechanical testing, metallurgical laboratory, and repair welding of aluminum castings. These special processes are all customer approved.

AVERAGE WORK FORCE: Production Workers - 160
Quality Control - 20
Engineering/Admin - 40

GROSS SALES: 1988 - \$26.9M
1987 - \$27.5M

PLANT SIZE: 86,000 sq ft

EQUIPMENT: Ceraseal is a very modern equipped investment casting foundry, including the latest robotics for shell dipping, computerized chemistry, mechanical testing and 3-dimensional measuring. Data is transferred to their main computer for further processing and certification.

EXPERIENCE: Ceraseal's present customer list is extensive including all major aerospace and defense-related industries in Canada, the US, and Europe.

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CHICOPEE MANUFACTURING LTD

ADDRESS. 975 Wilson Ave
Kitchener, Ontario
Canada N2C 1J1

CONTACT. Betty Sims, President and General Manager
Tim Rueffer, Marketing Manager
Tel: (519) 893-7575
Fax: (519) 893-5952

KEYWORDS. Aluminum Alloys, CNC Machining, Helicopter Hubs, Helicopter Retentions, High Strength Steels, Hydraulic Actuators, Landing Gear Components, Machining, Precision Machining, Precision Parts, Structural Components, Titanium.

HISTORY. Chicopee Manufacturing Limited is a private, wholly-owned Canadian company incorporated under the laws of Ontario in 1967.

CAPABILITY: The company specializes in precision machining of medium-to-large complex components to close tolerances from high-strength steels, titanium, and aluminum alloys for the aerospace and other related industries. Technical knowledge combined with state-of-the-art equipment enables the company to deliver a wide range of such quality products including aircraft structural components, landing gear components, helicopter hubs, helicopter retentions, hydraulic actuators, precision parts for Canada's space arm, and machined components for other space vehicles and equipment.

Chicopee maintains strict quality control and has approvals from most of the major aerospace companies and, in addition, complies with the requirements of AQAP-1, MIL-Q-9858, and CSA Z 299.3. Procedures call for first-off inspection of every manufacturing operation, as well as 100% final inspection of all critical dimensions. Reverse traceability of materials, parts, and processes is guaranteed.

AVERAGE WORK FORCE: 250

GROSS SALES: No data.

PLANT SIZE: 100,000 sq ft (Manufacturing Area)

EQUIPMENT: Equipment consists of a full range of CNC and NC profile milling machines including 2 five-axis CNC gantry profile milling machines; four-axis CNC travelling column machining centers with automatic tool changers; hydraulic trace profile milling machines; vertical, horizontal, and universal mills; CNC and conventional lathes; CNC and conventional boring mills, drilling and grinding tools, and all other necessary support equipment to produce precision custom products

EXPERIENCE: Present customers include Boeing Commercial Airplanes; Boeing Military Airplane Co; Cleveland Pneumatic Co; Boeing Canada, deHavilland Division; Ernst Leitz Canada Ltd; Fleet Industries; Indal Technologies Inc, Kaman Aerospace Corp, Lockheed Georgia Company, McDonnell Douglas Canada Ltd, Menasco Aerospace Ltd, Martin Marietta Aerospace; and Spar Aerospace

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CIBA-GEIGY CANADA Ltd

ADDRESS. 6860 Century Avenue
Mississauga, Ontario
Canada L5N 2W5

CONTACT Mr Niels M Nielsen, Industry Specialist -
Composite Materials
Tel: (416) 821-4420
Fax: (416) 881-8466

KEYWORDS. Composite (Components), Advanced Composites, Adhesives, Honeycomb Materials, Fabrics (Composite), Plastics, Laminates.

HISTORY. CIBA-GEIGY Canada Ltd is a Canadian-member company of the worldwide CIBA-GEIGY Corporation based in Basel, Switzerland. The company was formed on 1 January 1971 by the merger of two well established chemical corporations. CIBA has been operating in Canada since 1922 and GEIGY since 1945. The group consists of affiliates in some 60 countries, employing more than 80,000 people.

CAPABILITY. CIBA-GEIGY's Plastics Division manufactures synthetic resin systems and moulding compounds based on epoxies and other thermoset specialty resins. The products, owing to their excellent adhesive qualities, toughness, chemical resistance, and non-conductive properties, find their way into a wide range of applications such as construction, aerospace engineering, automotive, tooling, adhesives, and electrical applications. In combination with fiber reinforcement, such as fiberglass, aramid, and graphite, their resins are used to make aircraft and other military/civilian structures. These high performance, lightweight, fabricated products are especially valuable for aerospace applications. They include unique, lightweight, honeycomb structures made from aluminum foil and aramid in paper form and decorative, reinforced, plastics laminates.

The head office (Plastics Division) with warehouse/manufacturing is located in Mississauga, Ontario. There is also a warehouse located in Dorval, Quebec.

AVERAGE WORK FORCE. 30

GROSS SALES: 1988 - \$14M
1989 - \$16M

EXPERIENCE CIBA-GEIGY's current customer list includes the Canadian and US Governments as well as all major industries in Canada and the US involved in aerospace design and manufacture

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CML TECHNOLOGIES Inc

ADDRESS: 75, Boulevard de la Technologie
Hull, Quebec
Canada J8Z 3G4

CONTACT: Mr Miles Kermod, Vice President
Tel: (819) 778-2053
Fax: (819) 778-3408

KEYWORDS: ATC Communication Systems, Switch (Solid State); Multiplexed Switch; ATC Simulator; LCD Modules; Mobile Radio Consoles; Emergency Calling System; Intelligent Digital Programmable Switch; Data Over Voice Interface; Communications Systems; Mobile Communications.

HISTORY: CML Technologies Inc with its original name of Computational Methods Ltd was incorporated under the laws of Canada in 1978 by Mr David Choo. For the first three years, the company carried on the activity of scientific programming which was oriented mainly toward the solution of mechanical engineering problems found in aircraft structures.

Late in 1981, Mr Franz Plangger joined the company as a partner whereupon the mission of the company was changed toward designing and manufacturing communication products.

CAPABILITY: CML's products and activities are oriented toward the communications industry.

The COM-NODE line of products has been designed and programmed to fulfil the requirements of air-traffic control communications systems. They are systems capable of integrating as well as cross-connecting the radio communications and telecommunications networks found in most air traffic control centers. COM-NODE II consists of a modern and flexible architecture. It derives its flexibility from the fact that it is entirely software programmable and microprocessor controlled. CML has air traffic control systems in use in Edmonton, Alberta, Goose Bay, Labrador; and Baden and Lahr, West Germany.

The Mobile Radio Communications Console (MRCC) is a dispatching system consisting usually of one or many consoles and an associated central switch. The system provides the essential element of coordination and control over the mobile members of various groups or task forces.

The ESC-1000 system is designed to satisfy the requirements of the 9-1-1 emergency-number service market.

The ESC-1000 system is entirely software programmable, a fact which permits it to be equipped with a large selection of special features.

The Intelligent Digital Programmable Switch (IDPX) provides a voice and/or data switch to an organization who wants to establish quickly a communications system but control it from its own computer.

AVERAGE WORK FORCE: Engs - 30
Mfg - 15
Others - 7

GROSS SALES: No data.

PLANT SIZE: 26,000 sq ft

EQUIPMENT: CML Technologies is fully equipped for the design and production of communication systems.

EXPERIENCE: Present customers include various departments in the Canadian Government, Ericsson General Electric, Litton-Armecom, and GTE.

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COM DEV Ltd

ADDRESS: 155 Sheldon Drive
Cambridge, Ontario
Canada N1R 7H6

CONTACT: Mr M V O'Donovan, President
Tel: (519) 622-2300
Fax: (519) 622-1691

KEYWORDS: Communications, Microwave Subsystems; Microelectronics, Millimeter Wave Systems, Radar, Satellite Subsystems, Surface Acoustic Wave Subsystems, Signal Processing Subsystems, Radiometer, Electronic Warfare Subsystems; Microwave Switches.

HISTORY: COM DEV was incorporated federally in 1971 and is a Canadian, high-technology company.

CAPABILITY: Major business areas at which COM DEV's products are aimed include communications and remote sensing satellites, surveillance radar, electronic warfare and mm-wave systems.

- **Satellite Products** - Contiguous and non-contiguous dual mode output multiplexers; group delay and amplitude equalized input multiplexers; high power waveguide and low power coax isolators; low pass harmonic reject filters; telemetry, command, and preselect filters, adaptive variable power dividers and combiners; and polarization switches and beam reconfiguring subsystems. Com Dev is a participant in the Canadian DND EHF SATCOM project, Space Based Radar, and Radarsat.

- **Radar Products** - Specialized radar antennas, feed networks, phase shifters, high power filters and circulators, and SAW enhanced pulse compression subsystems. Com Dev supplies pulse compression subsystems to Raytheon (MUT FRAMP program), Mitsubishi Electronics, and other radar primes. A mm-wave radiometer designed to detect arctic ice conditions is under evaluation.

- **Electronic Warfare Products** - Microwave and millimeter subsystems, antennas for ESM and ECM applications, microwave subsystems; millimetric receivers; unique passive/active circular phased array; mm-wave payloads for RFPVs; and made-to-order mm-wave frequency extensions for RWR and RSM systems.

- **Antenna Products** - Design and manufacture of specialized antenna subsystems for spacecraft, airborne, shipborne, and transportable applications. Items such as SAR, phased arrays, high power beam-forming networks, and systolic arrays are available from UHF to EHF frequencies. A dual-polarized SAR antenna is flying in the Arctic with the Canadian Center for Remote Sensing.

- **Signal Processing and (SAW) Products** - Advanced signal processing components and subassemblies for radar and satellite communications; e.g., bandpass filters, dispersive delay lines, SAW oscillators and synthesizers, microscan (ESM) receivers, and code and chirp waveform generators.

- **Research and Development** - Active and passive techniques at frequencies from DC to over 115 GHz; SAW devices as signal processing elements in digital communications and radar systems; high-power ferrite technology and beam reconfiguring networks. Several EW projects funded by the Canadian DND and two by the US Army.

AVERAGE WORK FORCE: Technical Staff - 180
Manufacturing & Other - 140

GROSS SALES: 1988 - \$24.0M
1989 - \$26.0M

PLANT SIZE: 110,000 sq ft

EQUIPMENT: A large computer facility is used extensively for design (CAD), manufacture (CAM), and testing (CAT). There are automatic test facilities to measure product performance, thermal vacuum chambers to test performance in a simulated space environment, and shock and vibration equipment to simulate conditions from helicopters to shuttle launch. The microelectronics facility includes a recently enlarged and updated clean room, machining of items to 0.0001 inch tolerance and 6 micron finish, GaAs processing and MIC assembly. The plating facility is equipped to produce space-qualified nickel, copper, and silver plating, primarily on invar and aluminum parts. The antenna facility has an indoor anechoic chamber, a 500 foot outdoor test range, precision positioners and CAT equipment.

EXPERIENCE: COM DEV equipment flies on three-quarters of the free world's communications satellites. Virtually every major builder of earth stations in the western world uses some COM DEV components. Customers include Hughes Aircraft, RCA, Ford Aerospace, Litton, Lockheed, SPAR Aerospace, Marconi (UK), Harris, TRW and the Canadian & US Governments.

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CompEngServ Ltd

ADDRESS: Suite 600
265 Carling Avenue
Ottawa, Ontario
Canada K1S 2E1

CONTACT: Mr David G Bowen, Director of Engineering
Tel: (613) 563-1920
Fax: (613) 563-2516

KEYWORDS: Data Acquisition; Transportation Control Systems; Environmental Data Management, Systems Design, Independent Verification/Validation, Airport Flight Information Display Systems, ATC Systems, Artificial Intelligence, Neural Networks, Expert Systems, Real Time Control Systems, Systems Integration, Software Development, Computer Engineers.

HISTORY: CompEngServ Ltd is a 100% Canadian-owned, high technology, computer systems development company, founded in 1975. The company specializes in advanced software systems employing the latest technologies.

CAPABILITY: CompEngServ Ltd is involved in developing proof-of-concept systems for ATC, operational ATC systems, weather processing

research, data validation, and management systems as well as systems design, independent verification, and validation. CompEngServ is a subcontractor to the Hughes Aircraft Company for the Canadian Automated Air Traffic Control System (CAATS). Their capabilities cover the broad areas of systems engineering and computer science, system integration, project management, military standards, and training.

AVERAGE WORK FORCE: PhD - 1
Engs - 2
Computer Science - 5
Other - 4

GROSS SALES: 1988 - \$750K
1989 - \$950K

PLANT SIZE: 2000 sq ft

EQUIPMENT. Some electronics prototyping equipment, Unix development environments, desk top publishing, numerous state-of-art software packages.

EXPERIENCE. Our customers include Transport Canada, Department of Defence Electronic Warfare System Training (EST) Program Management Office, Boeing Corporation, Hughes Aircraft Company, Pan Am Computer Systems, Digital Equipment Company, Canadian Space Agency, Department of Fisheries and Oceans, Atmospheric Environment Services, USAF OTH Program Office, and German Hydrographic Institute.

REVISED: Mar 90

COMPUTING DEVICES COMPANY

ADDRESS: PO Box 8508
Ottawa, Ontario
Canada K1G 3M9

CONTACT Mr G M Mount, Senior Vice President
Tel: (613) 596-7105
Fax: (613) 820-5081

KEYWORDS: 1553 Data Buss; ASW; Acoustic Sensing; Avionics; Ballistic Computer Systems, C3 Systems, Cockpit Displays, Computers, Data Acquisition, Data Analysis, Data Handling, Fire Control, Instruments, Surveillance Systems, Navigation, Projected Map Displays, Radar, RPV Ground Control, Signal Processing, Systems Integration, Video Display Systems.

HISTORY Established in 1948, Computing Devices Company is the founding member of Ottawa's "Hi-Tech" community. Early successes included the sale of 4500 Position and Homing Indicators (PHI) to the F-104 aircraft of 17 nations and the fitment of the Projected Map System (PMS) in USAF/USN A-7 D/E aircraft and USAF PaveLow 3 helicopters. The company designs and manufactures advanced electronic systems for military applications. It markets on a worldwide basis with the US DOD as the largest customer. It has been a component of Control Data Corporation since 1969.

CAPABILITY Computing Devices is divided into five business areas: ASW Systems, Ground Systems, Display Systems, Surveillance Systems, and Contract Manufacturing.

The business areas are supported by comprehensive laboratory and CAD/CAM facilities and vertically integrated manufacturing facilities.

Quality Control systems are compliant to DND 1015/MIL-Q-9858, and AQAP-1/13.

• ASW Systems

The company's start in ASW systems was with the USN SOSUS and Nav Air communities. Present products include the company-designed and developed sonobuoy processor (UYS-503) which has been sold to the Swedish Air Force, Canadian Navy, Australian Navy, and United States Navy. For Canada's

and Portugal's surface fleets, the company is producing the SQS-510 Active Sonar and the SQR-501 Towed Array Sonar for Canada. For Canada's new Shipborne Aircraft Project, Computing Devices is developing the dipping sonar/sonobuoy system and the command and control system which also serves as the integrating element for the mission sensors on the 1553B data bus.

• Ground Systems

The company has worked on ballistics computation since the early sixties. This work led to the development and production of a digital ballistic fire control computer for the US Army Abrams M1A1 main battle tank. In excess of 7000 systems have been fielded, and the company has been contracted for the balance of the M1A1 production run.

The Ground Systems Division is also producing ballistic fire control computers for the Republic of Korea main battle tank, the M48A5/T2 main battle tank upgrade for Turkey, and the M48H main battle tank upgrade for Taiwan. In addition, a prototype battle field management system has been installed in the Abrams main battle tank. Also under development is the fire control system for the UK Challenger 2 main battle tank. This division also developed and produced the MiliPac artillery computer for the Canadian Forces, and a derivative C3 system for the Avibras Astros II. A new product, computerized laser sight (CLASS), has also been developed for anti-tank weapons, machine guns, and other small arms with capabilities similar to more complex weapon systems at a fraction of the cost.

• Display Systems

The Shipboard Integrated Processing and Display Systems (SHINPADS) has been developed for the Canadian Navy to provide state-of-the-art system integration encompassing the entire ship including combat system equipment, propulsion and damage control systems, and the administrative support hardware. Computing Devices' SHINPADS standard display (SSD) is a true multi-sensor display that accepts video input data from all shipboard sensor systems and, through digital scan conversion techniques and large scale real-time random access memory, provides both sensor information and complex graphical overlays on high resolution, full color television monitors.

Computing Devices' SSD interfaces with any general purpose VMEbus-capable computer functioning as a display processor or with an ADA-capable embedded processor. Standardization of hardware, software, and interfacing has been achieved to the point where this unique display satisfies all of the requirements for operational interface with any sensor, weapon, or machinery control function. It is a powerful tactical and command situation display providing the command and control team instant access to all data available on board. The SSD may be reconfigured dynamically by system command and operator intervention to any function in the user's repertoire.

Computing Devices' SHINPADS standard display has been adopted as the standard display for the Canadian Navy.

The Display Systems Division also produces MIL-STANDARD electroluminescent panels. In addition, they are currently in full scale engineering development of the sensor scan converter for the US Navy's AN/SAR-8 shipboard infrared system.

• Surveillance Systems

Computing Devices Company is a world leader in high performance outdoor surveillance systems for a broad range of military applications. The company has been under contract for R&D to all three DOD services and other government agencies. The AN/GSS-34 is a full MIL SPEC long perimeter buried line sensor (up to 3200 meters per system) developed for the USAF (ESD, Hanscom AFB) to base and installation security system (BISS) requirements. This division is also under contract to the US Navy to develop and manufacture a waterside surveillance system. The system provides the C3 function for a variety of detection sensors with integrated display and threat assessment.

Building on the company's established technology base and market penetration in ground and shipboard combat systems, displays, and real time C3, Computing Devices has developed a capability in ground/shipboard control subsystems for unmanned vehicle systems such as RPVs, drones, and test targets. The subsystem capability encompasses mission/flight planning, mission management recording, and sensor data analysis.

• *Contract Manufacturing*

Computing Devices' fully integrated manufacturing facilities are made available to companies requiring alternate sources of supply for sophisticated electronics systems. Major customers include Hughes Aircraft and FMC.

AVERAGE WORK FORCE: Professionals – 400
Total – 1200

GROSS SALES: 1988 – \$118M
1989 – \$125M

PLANT SIZE: 425,000 sq ft (five buildings)
400 Acres (Stittsville research facility)

EQUIPMENT. Computing Devices' extensive equipment holdings include CAD/CAM, NC machining, robotic assembly and environmental test facilities.

EXPERIENCE. Computing Devices has considerable experience with the US military (approximately 50% of their total sales). They have outstanding production facilities.

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CONAIR AVIATION Ltd

ADDRESS: PO Box 220
Abbotsford, British Columbia
Canada V2S 4N9

CONTACT Mr Robert Stitt, Marketing Representative
Tel: (604) 853-1171
Fax: (604) 853-9017

KEYWORDS: Modification (Aircraft); R&O (Aircraft); Aerial Delivery Systems; Fire Fighting Equipment (Aircraft); Fire Detection & Mapping; Oil Spill Control.

HISTORY: Conair Aviation Ltd is a Canadian-owned, specialty aviation company founded in 1969. Conair is the parent company to three subsidiary companies, most of which are involved in specialty aviation products and services.

CAPABILITY: Conair is primarily involved in providing aerial fire fighting services and products for fixed and rotary wing aircraft.

The company converts aircraft to the air tanker configuration, such as the F27 Firefighter, Conair Firecat, and Turbo Firecat, and designs and manufactures fire fighting systems for various types of helicopters. The company also designs and manufactures aerial spray systems for fixed and rotary wing aircraft. Conair-developed aircraft and systems are used in Canada, Australia, France, the US, Spain, Portugal, Italy, Japan, and Saudi Arabia. The company's capabilities include aeronautical engineering (using computer-aided design (CAD)), aircraft modification and systems manufacturing, fleet management (Conair operates the largest private fleet of air tankers in the world.), quality assurance, and training.

AVERAGE WORK FORCE: Engineering – 25
Production – 160
Operations – 134
Others – 46

GROSS SALES: 1988 – \$22.0M
1989 – \$21.0M

PLANT SIZE: 130,000 sq ft

EQUIPMENT. Conair's equipment includes a fleet of 50 fixed wing and 30 rotary wing aircraft, CAD system, and in-house manufacturing, aircraft maintenance, modification, repair, and overhaul shops.

EXPERIENCE. Conair's present customers include various departments in the Canadian and British Columbia governments, the USAF, the Government of France, and forest protection agencies in Portugal and Spain.

REVISED: Mar 90

COORDINATE TOOL Ltd

ADDRESS: 5640 Tomken Road, Unit 1
Mississauga, Ontario
Canada L4W 1P4

CONTACT: Mr Ivan Krajac, President
Tel: (416) 625-1666

KEYWORDS. Aircraft Parts; Machining, Precision Machining; Parts (Aircraft); Milling.

HISTORY Coordinate Tool Ltd is a private, Canadian-owned company specializing in application of precision CNC and conventional machining. The company was incorporated in Ontario in 1985.

CAPABILITY Coordinate Tool Ltd (CTL) is primarily involved in manufacture of aerospace and aircraft parts. CTL provides engineering and production services exclusively to aircraft and aerospace industries. The company specializes in close tolerance and complex production requirements.

AVERAGE WORK FORCE: 15

GROSS SALES: 1988 – \$0.8M
1989 – \$1.5M

PLANT SIZE: 10,000 sq ft

EQUIPMENT: CTL has various precision CNC and conventional machining equipment including BMC 40 and BMC 20 Hurco CNC machining centers, Mazak VZC 15/40 and Mazak AJV 25/405 CNC machining centers, Deckel FP4 CNC milling machine, Hardinge tool room lathe, Universal and Brigbort milling machines, and Mitytoyo coordinate measuring machine.

EXPERIENCE: No data.

REVISED: Mar 90

CROVEN CRYSTALS Ltd

ADDRESS: 500 Beech Street
PO Box 420
Whitby, Ontario
Canada L1N 5S5

CONTACT Mr Bob McCormick, Marketing Manager
Tel: (416) 668-3324
Fax: (416) 668-5003

KEYWORDS Crystals, High Q Crystals, Quartz Crystals

HISTORY Croven started as a subsidiary of a US company set up in Whitby in 1954 to manufacture crystals for a NATO contract held by Collins Radio of Toronto. In 1958, the US parent sold the company to the management. In 1967, the company was purchased by a US conglomerate. It is presently owned by Oak Industries, but has been managed since 1970 solely by Canadians.

CAPABILITY: Croven manufactures quartz crystals and only quartz crystals. Within this product line, Croven has carved out a niche as one of the premier suppliers of high quality, high reliability quartz crystals to the telecommunications, avionics and aerospace industries, as well as directly to the military.

Their crystals are used by companies making telephone equipment, microwave radios, radar for ground and airborne applications, and missile and satellite systems. Some of the better known programs are the fire control radar in the F-16 and F-18 fighter planes, the Navy's Phalanx Weapon System and shipboard radar, the Standard Missile, Voyager Space Craft, and many of GE Aerospace's satellites.

Their ongoing research and development programs combined with their state-of-the-art testing and screening facilities, make them second to none in the industry.

AVERAGE WORK FORCE: Engineers – 5
Technicians – 10
Others – 120

GROSS SALES: 1988 – \$8.8M
1989 – \$9.1M

PLANT SIZE: 30,000 sq ft

EQUIPMENT: Equipment includes all necessary equipment to manufacture and test high quality, high reliability quartz crystals. IBM System 34 is used for production control.

EXPERIENCE: Present customers include: AvanteK, Bendix, California Microwave, DESC, E-Systems, Equatorial Communications, Frequency West, Frequency Sources, Garrett, General Dynamics, GTE, GE, Harris, Hewlett Packard, Honeywell, Hamilton Standard, Hughes, ITT, JPL, Lockheed, McDonnell Douglas Elect, Magnavox, MCI, M/A Com, Motorola, Martin Marietta, Northern Telecom, Omni Spectra, Plessey, Rockwell, Raytheon, RCA, Spar, Sperry, Scientific Atlanta, Sanders, Texas Instruments, TRW, Varian, Westinghouse, Wilcox, Watkins-Johnson, plus many divisions of the US and Canadian military and Government

REVISED: Mar 90

CRYSTAR RESEARCH Inc

ADDRESS: 102-721 Vanalman Avenue
Victoria, British Columbia
Canada V8X 3B6

CONTACT: Robert F Redden, PEng, President
Tel: (604) 479-992
Fax: (604) 470-2734

KEYWORDS: Crystals, Domes (Missile), Sapphire Crystals & Materials, Zinc Oxide Crystals; Beta Barium Borate Crystals; Lithium Triborate Crystals; Laser Rods; Titanium Doped Sapphire; Optical Materials; Aluminum Oxide (High Purity), Aluminum Isopropoxide, Magnesium Fluoride Crystals, Infrared Optics, Flux Crystal Growth, Ruby Crystals, CNC Milling; Nonlinear Optic Materials; Missile Domes

HISTORY: Crystar Research was founded in August 1987 as a wholly-owned subsidiary of Cominco Limited and in December 1988, along with the other Cominco Electronic Materials businesses, was sold to Johnson Matthey PLC of London, England. Crystar plant and offices are located in Victoria, British Columbia.

CAPABILITY: Crystar Research Inc is involved in the growth, fabrication, and characterization of single crystal oxide crystals for optic and optoelectronic applications. In addition to sapphire fabrications, including IR lenses, Crystar is engaged in production of titanium doped sapphire for laser materials and in a number of flux growth crystal technologies including zinc oxide, beta-barium borate, and lithium triborate. In addition to crystal growth furnaces, Crystar has a fully-equipped, hard materials machine shop for the preparation of a complete line of fabricated crystal products. High purity chemicals are prepared on site.

AVERAGE WORK FORCE: PhD – 2
Engs – 2
Others – 7

GROSS SALES: 1988 – \$591K
1989 – \$945K

PLANT SIZE: 5,907 sq ft

EQUIPMENT: Crystal growth furnaces including ADC Czochralski up to 2200°; hard materials fabrication shop, including polishing and quality control facilities, Zygo interferometer. In-house computers include IBM PCs and Macintosh PCs with networking, data logging, and process control capabilities. Large scale vacuum or inert gas isothermal annealing capability to 2000°. The company has a number of in-house-developed hard-material fabricating equipment.

EXPERIENCE: Present customers include various departments of the Canadian government, as well as corporate entities in Europe, Canada, and the United States.

REVISED: Mar 90

CTS OF CANADA LTD (Industrial Electronics Division)

ADDRESS: 80 Thomas Street
Streetsville, Ontario
Canada T5M 1Y9

CONTACT: Mr R J Holmes, Operations Manager
Tel: (416) 822-1141
Fax: (416) 858-9058

KEYWORDS: DC Power Supplies; Battery Chargers, DC Rectifiers; Converters (Power); Inverters (DC-AC); Static Switches; Power Supplies (Uninterruptible); Degaussing Systems.

HISTORY: The Canadian company was founded in 1932 as C C Meredith. CTS Corporation purchased C C Meredith in 1953 and expanded production and engineering capabilities into the industrial electronic market in 1958 through the purchase of Allied Industrial Electronics of Canada, Limited of Toronto. The company's name was changed to CTS of Canada, Limited, in 1960.

The Industrial Electronics Division of CTS of Canada, Limited is a major Canadian manufacturer of power conversion equipment. CTS designs and manufactures custom DC power supplies, battery chargers, DC rectifiers, AC-AC and DC-DC converters, DC-AC inverters, static switches, uninterruptible power supply systems, degaussing systems, and cathodic protection rectifiers.

CAPABILITY: CTS has over 30 years' experience in custom designing and manufacturing of equipment to customer specifications. The Industrial Electronics Division has complete research and development, design, manufacturing and testing responsibilities at the Streetsville, Ontario, facility. Their major customers have utilized their products in the defense, power generation, telecom, government, nuclear power, transportation, and communications sectors of the market. Equipment has been successfully qualified to meet commercial and military specifications for shock, vibration, seismic, EMI, and nuclear environments.

AVERAGE WORK FORCE: 30

GROSS SALES: \$2.5M

PLANT SIZE: 20,000 sq ft

EQUIPMENT: No data.

EXPERIENCE: CTS customers include provincial and federal governments and manufacturing, power generating, and communications companies throughout Canada.

REVISED: Apr 90

CVDS Inc

ADDRESS: 6900 Trans Canada Highway
Pointe Claire, Quebec
Canada H9R 1C2

CONTACT: Mr Gerry Sullivan, Vice President Marketing
Tel: (514) 694-9320
Fax: (514) 694-0786

KEYWORDS: Transportation Control Systems, ATC Systems, Airport Status Systems; Flight Information Display Systems, Data Acquisition, Data Processing.

HISTORY CVDS is a Canadian owned, high-technology, electronics company founded in 1972. The firm's original name was Canadian Voice Data Switching, but this name was modified to the CVDS acronym to better reflect the broader range of products and services now being offered. CVDS operates branch offices in Toronto and Ottawa and works with manufacturer's representatives in the United States.

CAPABILITY CVDS is primarily involved in the design, development, and manufacture of customized equipment and systems for communications control related applications. Recent projects include the following air traffic control systems: CTSDS (Common Time Source Distribution System), OIDS 2 (Operational Information Display Systems), and MACS (Modular Aeronautical Communications Switch.)

CVDS also designs and manufactures both custom and off-the-shelf power supplies for industrial and government applications.

The firm has considerable expertise in the field of digital signal processing and has in-house experience in computer hardware and software systems, power systems, telecommunications, telephony, and SCADA (supervisory control and data acquisition).

AVERAGE WORK FORCE: Engineering - 40
Manufacturing - 45
Others - 15

GROSS SALES: 1988 - \$5.5M
1989 - \$8.5M

PLANT SIZE: 62,000 sq ft

EQUIPMENT: The company maintains the following types of equipment used in the development and manufacture of their products:

- Development:
 - microprocessor emulation/software debug systems
 - DSP (digital signal processor) emulation/software debug systems
 - transformer/coil winding equipment
 - machine shop
 - temperature/humidity chamber
 - vibration tester (shake table)
 - scopes, meters, spectrum analyzers, etc.
- Manufacture:
 - wave solder
 - aqueous cleaning bath
 - burn-in room
 - PWB assembly stations
 - PWB and subsystem test stations
 - automated power supply tester
 - Hi-Pot testers

EXPERIENCE: Clients include both government and industrial organizations in Canada, the United States, and Europe, such as Transport Canada (aviation and marine), Department of Supply and Services, Royal Canadian Mounted Police, Bendix Avalex, Paramax (Unisys), Oerlikon Aerospace, Canadian Marconi, Harris (Farrion), Northern Telecom, Digital Equipment Corp, CNCP Telecommunications, Bell Canada, Maritime Telegraph & Telephone, Rogers Network Services, Hydro Quebec, Ontario Hydro, and Honeywell (Sperry Aerospace).

REVISED: Apr 90

DALSA Inc

ADDRESS: 550 Parkside Drive
Waterloo, Ontario
Canada N2L 5V4

CONTACT: Mr Tom Jenkins, General Manager
Tel: (519) 886-6248
Fax: (519) 886-8023

KEYWORDS: CCTV, Machine Vision, Imaging Arrays, CCD Image Sensors, Satellite Reconnaissance Sensors.

HISTORY: The company is located in Waterloo, Ontario, approximately 60 miles from Toronto. Dalsa was established in 1980 to pursue advanced CCD design and manufacture. A private company, owned by Canadians, Dalsa operates a design center and production facility from a single Waterloo location.

The origin of Dalsa and its image sensor technologies dates back over 20 years when one of the founders of the company, Dr Savvas Chamberlain, pioneered many of the basic devices central to image sensing technology.

CAPABILITY. The company manufactures over 45 different high-performance sensors for international markets. These products are documented in a 250-page data book available from Dalsa. The company has specialized in the industrial and government market sectors providing components for applications such as optical computing, machine vision, object inspection, and process control. Customers are distributed throughout North America, Europe, and Asia. The company has 23 sales offices worldwide.

Dalsa introduced the first imaging device with a dynamic range of more than 1,000,000:1, which is a capacity slightly greater than the human eye and more than 1,000 greater than other available devices.

Other products include the Turbosensor which provides more than double the industry standard operating speed with data rates exceeding 60 MHz. The Quiesensor is made from an advanced imaging technology known as time delay and integration which permits sensing capabilities approximately 100 times more sensitive than the human eye.

AVERAGE WORK FORCE: PhD - 2
Eng - 8
Other - 60

GROSS SALES: No data.

PLANT SIZE: 12,000 sq ft

EQUIPMENT: Equipment includes full design and manufacturing equipment for custom image sensor production.

EXPERIENCE: Dalsa's customers include DREO, CCRS, NRL, and DSS.

REVISED: Apr 90

DATAP SYSTEMS

ADDRESS: 225-4259 Canada Way
Burnaby, British Columbia
Canada V5G 1H1

CONTACT: Mr Terry Engelhart, General Manager
Tel: (604) 430-6683
Fax: (604) 433-2561

KEYWORDS: Systems Integration, Data Acquisition, Data Processing, Network Management, Telecommunications Monitoring, Custom Software, Communication Control Center Software, Process Control, Preventive Maintenance, Network Inventory, Operation Support Systems, Management Information Systems, Artificial Intelligence Systems.

HISTORY. DATAP Systems was incorporated in 1969 to provide a complete range of software programming and systems engineering services. Since inception, DATAP has acquired project experience which spans a broad range of system activities including feasibility studies, conceptual design, software and hardware design, system implementation, training and commissioning, and even turnkey system services. DATAP is a division of Sandwell Inc, who operates fifteen engineering organizations.

CAPABILITY: DATAP Systems is a systems integrator that offers products and services which enable the client to effectively and efficiently manage their communication networks. DATAP's commercial off-the-shelf Advanced Network Management Architecture (ANMA) comprises a set of product platforms and tools enabling DATAP to deliver cost effective solutions in a relatively short time frame. Along with the products, DATAP offers services in related areas from feasibility study through systems design and integration to factory testing and field installation and customer training.

AVERAGE WORK FORCE: 180

GROSS SALES: 1988 - \$24.6M
1989 - \$26.7M

PLANT SIZE: No data.

EQUIPMENT. DATAP Systems uses Digital Equipment Corporation VAX hardware and software products

EXPERIENCE. DATAP has an extensive list of clients from the telecommunication industry, power and pipeline industries, and transportation industry.

REVISED: Mar 90

DEFT

ADDRESS: 557 Dixon Road
Suite 111
Rexdale, Ontario
Canada M9W 1H7

CONTACT: Robert J Mancey, Marketing Support Representative
Tel: (416) 249-2246
Fax: (416) 245-6241

KEYWORDS: Computer Aided Software Engineering; Relational Database Management System; Macintosh to VAX Connectivity, Relational Portability; Software Engineering; Databases; Systems Analysis; Query Language; Analysis and Design Tools; Structured Methods Education/Training; SQL Generation.

HISTORY DeftTM was developed by a fixed price, custom software development company named DISUS. The tools were developed and used internally, before being marketed as a product. DEFT grew into an independent, Canadian owned company operating worldwide, with head office in Toronto. Their mission is to provide RDBMS software engineers with CASE Tools offering functionality around the complete system development life cycle.

CAPABILITY The DeftTM CASE System allows RDBMS engineers to design systems using the Macintosh's intuitive interface. DeftTM supports data and process modelling via ERD, DFD, and PSD diagramming tools. Deft's Gateways generate SQL schema and user screen forms automatically from the design, as well as a reverse engineering facility that takes you back to CASE diagrams, thereby covering the full life cycle of projects. DeftTM supports Ingres, Oracle, Sybase, and Rdb.

AVERAGE WORK FORCE: No data.

GROSS SALES: No data.

PLANT SIZE: No data.

EQUIPMENT: No data.

EXPERIENCE. Deft customers come from all industries where information systems development is an integral part of their competitive edge. Some of their customers include McDonnell Douglas, BDM International, Hughes Aircraft, TRW Space and Defense, Rockwell International, 3M, Bell Canada, General Electric, Nestle, Shell Oil, BP Exploration, Dofasco, Eastman Kodak, Eli Lilly, Honeywell, Northern Telecom, Ontario Hydro, and The Mitre Corporation.

REVISED: Mar 90

DESIGNED PRECISION CASTINGS Inc

ADDRESS: 75 Eastern Avenue
Brampton, Ontario
Canada L6W 1X9

CONTACT: Mr Paul Roy, Sales Manager
Tel: (416) 453-0421
Fax: (416) 453-3694

KEYWORDS: Castings; Investment Castings.

HISTORY: Designed Precision Castings Inc is a Canadian-owned investment foundry that was established in Brampton in 1958.

CAPABILITY. Designed Precision Castings Inc is an investment casting firm involved in the aerospace, defence, nuclear and commercial markets. The company pours both ferrous and non-ferrous alloys in a size range from ounces to sixty pounds. The plant is located in Brampton, Ontario - a suburb of Toronto, Ontario. From Brampton it serves both the local market and the greater North American market, with customers from California to Nova Scotia.

Comprehensive in-house testing is performed according to a written quality control manual. Testing facilities include spectrographic alloy analysis, magnetic particle inspection, liquid penetrant inspection, x-ray, hardness and tensile testing.

Work is done in accordance to military specifications MIL-I-45208 and to many of our customers private specifications for whom we are an approved source. As required, traceability is maintained and records are preserved for 7 years.

AVERAGE WORK FORCE: Office - 8
Inspection - 5
Production - 31
Engineering - 3

GROSS SALES: 1988 - \$3.0M
1989 - \$3.0M

PLANT SIZE: 42,000 sq ft

EQUIPMENT. Designed Precision Castings has a complete investment casting facility including a spectrometer, a 100 ton wax extruder, temperature and humidity controls in the shell room, autoclave dewaxing and induction melting. The Quality Control department has hardness and tensile testers, liquid penetrant and wet magnetic particle inspection systems and a 320 KV x-ray machine.

EXPERIENCE: Designed Precision Castings has done work for a wide range of customers in the Aerospace and Nuclear industries including some Class 1 Grade A Castings. We have been surveyed and hold quality control approvals for the following firms. General Dynamics, McDonnell Douglas Corp, Pratt and Whitney Canada, deHavilland Aircraft, Colt Industries, Garrett Manufacturing, Brunswick Defense Corp, Hazeltine Corp, Bendix Avelex, and Sikorsky Helicopter.

REVISED: Mar 90

DEVTEK CORPORATION

ADDRESS: Suite 500
100 Allstate Parkway
Markham, Ontario
Canada L3R 6H3

CONTACT: Mr D Maxwell
Tel: (416) 752-4006
Fax: (416) 752-4838

KEYWORDS: ASW, Alum Dip Blazed Heat Exchangers, Environmental Laboratory, HF Antennas, HF Communications, Landing Gear Assemblies and Components, Machining, Satellite Platforms, Oil Coolers, Hydraulic Actuators, EMI/RFI Cabinetry, Bonded Enclosures, Airframe Structures; Acoustic Sensing; Actuators; Fasteners; Stabilized Platforms; Towed Arrays, Engine Control Valve Bodies, Optic Housings, Naval Cabinetry (EMI/RFI), Flight Controls, Helicopter Rotors, Engine Weldments, Engine Rotating Components, R&O (Small Arms), Small Arms Components, Sonobuoys, Weather Stations, Welding.

HISTORY Devtek Corp is a wholly owned Canadian company founded in 1980. Companies affiliated with Devtek are Diemaco Inc, Hermes Electronics Ltd, Magtron Precision, Verral Metal Fabricators, Aerobond Technologies, West Heights Mfg Inc, Hochelaga Aerospace Inc, Dexter Tool Co, and GMI Precision Corp.

CAPABILITY: Devtek has twelve modern plants, each specializing in various phases of high technology engineering and manufacturing products ranging from undersea detection devices to components for outer space projects. Having pursued markets in the aerospace/defense and commercial goods sectors, Devtek has relied on its people to develop unique, new, highly efficient manufacturing techniques. This confidence has resulted in an average annual sales growth of 30% and has made Devtek one of the fastest growing international manufacturing corporations. Devtek's nine companies offer a wide range of modern manufacturing technologies, staffed with highly qualified people with unique experience in fabricating critical components and subassemblies. Devtek has assembled extensive engineering and manufacturing skills for the design, development, testing, and production of components and systems for military small arms, hydro-acoustic sensors, flight controls and stabilized platforms. In addition, strong manufacturing capabilities exist in aircraft engine rotating components and weldments, landing gear, electronic enclosures, and heat exchangers, helicopter rotors, naval cabinetry and aircraft fasteners. Devtek's divisions and companies operate to the following quality specifications as appropriate: AQAP-1, MIL-Q-9858A, AQAP-4, and MIL-I-45208.

AVERAGE WORK FORCE: 1500

GROSS SALES: 1988 - \$135M
1989 - \$154M

PLANT SIZE: No data.

EXPERIENCE: Devtek's varied clientele includes Bell Aerospace Co; Boeing Seattle; Boeing Canada, Bristol Aerospace Ltd; CAE Electronics Ltd; Canadair Ltd, Dowty Rotol, Menasco Aerospace, Cleveland Pneumatic; Bell Helicopter; Pratt & Whitney; Hamilton Standard; Burroughs; USAF, IBM Federal Systems Division; Kaiser Electro-Optics, Paramax Electronics, French Navy, Swiss Army Signal Corps, Australian Navy, Canadian General Electric, Computing Devices of Canada Ltd; the deHavilland Aircraft Company of Canada Ltd; Dowty Canada Ltd, General Electric Co, Hughes Aircraft, Honeywell Inc, Leigh Instruments, Litton Guidance and Control Systems, Litton Systems Canada Ltd; Martin Marietta; McDonnell Douglas Corp; Northern Telecom, Raytheon Co, Sandars Associates, Spar Aerospace, Sperry Univis, Canadian Department of National Defence, and others.

REVISED: Mar 90

DIEMACO (1984) Inc

ADDRESS 1036 Wilson Avenue
Kitchener, Ontario
Canada N2C 1J3

CONTACT: Maurice A Clermont, Marketing Director
Tel: (519) 893-6840
Fax: (519) 893-3144

KEYWORDS: Weapons; Small Arms; Stabilization Platforms; Electro Mechanical Systems; R&O (Small Arms); R&O (Stabilization System); Technical Publications.

HISTORY. Diemaco (1984) Inc is a division of Devtek Corporation, a Canadian owned company. Diemaco was established in 1976 as Canada's Centre of Excellence for Small Arms to provide an assured source of supply and mobilization base.

CAPABILITY. Diemaco is the prime contractor for Canada's Small Arms Replacement Program (SARP) and is the Centre of Excellence for Small Arms in Canada. The division provides a complete capability for design, development, and life cycle support. New projects include a .22 calibre training rifle and 5.56mm light machine gun. Recent efforts are directed toward larger calibre weapons systems. The company offers a design, development, and production capability for stabilization systems. It produces the stabilized platforms for the Air Defence Anti-Tank System (ADATS) for Canada, United States, and world markets. Other capabilities include the manufacture of high-precision, machined and laser-welded components for weapons, platforms, and missiles.

AVERAGE WORK FORCE. Engs - 15
Others - 300

GROSS SALES: 1988 - \$28M
1989 - \$31M

PLANT SIZE Diemaco - 38,000 sq ft
Grantch - 40,000 sq ft

EQUIPMENT. GFM Hammerforge for barrel production, gun drilling, high precision NC machining, 30- and 50-metre test range, laser welding, stabilization modelling, experimental and production test stations, clean room assembly, and electrical harness manufacturing and test equipment.

EXPERIENCE. Prime contractor for Canada's Small Arms Replacement Program (SARP), manufacturers of the stabilized platform for the ADATS electro-optical module.

REVISED: Mar 90

DIEMASTER TOOL Inc

ADDRESS: 160 Watline Avenue East
Mississauga, Ontario
Canada L4Z 1R1

CONTACT: Mr Tary Lozowskij
Tel: (416) 890-1144
Fax: (416) 890-1950

KEYWORDS Boring, CNC Machining, Die Fabrication, Gauges, Machining, Milling, Precision Machining, Shafts, Stamping, Turning

HISTORY Diemaster is a Canadian-owned company that has been in business for over 18 years.

CAPABILITY Diemaster is a precision engineering/machining firm specializing in machining to aerospace, military, and nuclear standards, jig boring; CNC machining; EDM machining; turning; and milling. A major product line is the manufacture of gas turbine engine shafts and related components. Diemaster performs electron beam welding of critical component parts. They perform stamping operations from 16 to 500 metric tons. Diemaster also designs and fabricates production tooling, special purpose machines, jigs, fixtures, gauges, and dies. Their quality control meets CSA-Z-299.3, AQAP-4, MIL-Q-9858A, and MIL-I-45208A.

AVERAGE WORK FORCE: Total - 100

GROSS SALES: 1988 - \$8.2M
1989 - \$9.0M

PLANT SIZE: 66,000 sq ft

EQUIPMENT: NC & CNC machining centers and computing centers. Complete MACAUTO CAD/CAM capability and small to large size coordinate measuring machine capacity. Other typical equipment includes mills, grinders, borers, milling machines, drills, lathes, pantograph, presses, and cutting, finishing, and inspection equipment.

EXPERIENCE: Diemaster customers include SPAR, Argotech, US Army Aviation Systems Command, General Electric, EDO Canada, Textron Lycoming, Sanders' Associates, Dupont, IBM, McDonnell Douglas, Pratt & Whitney, Xerox, Rockwell International, and many more well-known companies. Products to these companies have included aircraft engine shafts and related components, ground support equipment, fuel tanks, critical components for aircraft navigation systems, components for nuclear industry, dies, gauges, test and production centers, and stampings.

REVISED: Mar 90

DIPIX TECHNOLOGIES Inc

ADDRESS: The Baxter Center
1050 Baxter Road
Ottawa, Ontario
Canada K2C 3P1

CONTACT: Mr Mike Cockburn, US Sales Executive
Tel: (613) 596-4942
Fax: (613) 596-4914

KEYWORDS: Digital Image Analysis; Image Processing; Software Development; Software Services; Storage of Digital Imagery; Transmission of Digital Imagery; Turnkey Image Processing Systems; Geographical Information Systems (GIS); Radar Data; Landsat Data.

HISTORY: Dipix Technologies Inc is a Canadian-owned company incorporated in Canada in December of 1987 (formerly Dipix Systems Ltd - incorporated in September of 1978). Dipix is represented on a worldwide basis by various companies.

CAPABILITY: Dipix Technologies Inc has an established capability in the field of digital image processing for remote sensing, digital terrain mapping, and other applications. The company has developed a powerful family of image analysis systems capable of processing imagery from satellite data (e.g., Landsat, SPOT, Radar), digitized imagery (e.g., photographic), geographical information systems (e.g., ARC/INFO, Intergraph, TYDAK), cartographic (Map Digitizer), seismic, and other sources. Dipix engineers, analysts and programmers have designed many unique features into its systems. As a result, the company has been able to establish and maintain a leading market position with export sales around the world.

Central to Dipix's highly regarded position in the image processing field, is its extensive technical and analytical experience in developing applications and utility software to address user operational needs. Dipix has an enviable in-house research and development track record. The company's ARIES III image analysis system with its proprietary ARIES pixel processor offers a programmable high-speed processor for improved interactive image processing of large images.

AVERAGE WORK FORCE: PhDs - 2
Masters - 3
Bachelors - 10
Others - 7

GROSS SALES: 1988 - \$2M
1989 - \$5M

PLANT SIZE: 10,000 sq ft

EQUIPMENT: Dipix has a full range of modern test equipment including DEC VAX and micro VAX computers, as well as a number of Dipix ARIES Systems used for program and engineering development.

EXPERIENCE: Dipix personnel have many years of experience in digital image analysis going back to the early 1970s. Dipix has had a close relationship with the Canada Center for Remote Sensing, where they have provided both hardware and software development. At present,

Dipix has in excess of 200 turnkey digital image analysis systems installed world wide. Typical applications include mapping, forestry, agriculture, geology, cartography, and hydrology.

REVISED: Mar 90

DONLEE PRECISION

ADDRESS: 9 Fenmar Drive
Toronto, Ontario
Canada M9L 1L5

CONTACT: Mr Rodney Innes, Sales Manager
Tel: (416) 743-4417
Fax: (416) 746-8998

KEYWORDS: Boring; Cylinders; Gears; Grinding; Jet Engine (Components); Landing Gear Components; Machining; Non-Destructive Testing; Shafts.

HISTORY: Donlee Precision is a Division of General Donlee Limited. Donlee Precision was founded in 1966.

CAPABILITY: Donlee Precision is a manufacturer specializing in precision tubular and shaft type components for the Aerospace, Military and Nuclear industries. Components manufactured include jet engine shafts, landing gear cylinders and pistons, rotor masts, and propeller shafts. Capabilities include complete engineering, manufacturing and quality assurance departments.

AVERAGE WORK FORCE: Engineers - 3
Manufacturing - 65
Administrative - 15

GROSS SALES: No data.

PLANT SIZE: 60,000 sq ft

EQUIPMENT: Production facility includes CNC turning and milling, gear cutting and grinding, internal honing, deep hole boring, ID grinding, and OD grinding. Quality Assurance includes complete inspection and non-destructive testing facilities.

EXPERIENCE: Present customers include Canadian Government Crown Corporations and major aerospace and military contractors in both Canada and the US.

REVISED: Mar 90

DOWTY CANADA ELECTRONICS Ltd

ADDRESS: 2000 Fisher Drive
PO Box 4525
Peterborough, Ontario
Canada K9J 7B1

CONTACT: Mr D Crook, General Manager
Tel: (705) 743-6903
Fax: (705) 745-1394

KEYWORDS: Avionics Design Engineering; Steer by Wire Systems; Build-To-Print; PCB Fabrication; Test Equipment; Specialized Test Equipment; Wiring Harness Fabrication; Cabinets; Cabinet Testing.

HISTORY: Dowty Canada Electronics Ltd was incorporated in 1976 to design, manufacture, and service electronic products for the communications, air, maritime, and ground transportation markets. In 1982, Dowty Canada Electronics Ltd (formerly Simtron Ltd) was acquired by Dowty Equipment of Canada Ltd. Dowty specializes in the design, development, manufacturing, certifications testing, and overhaul of landing gear, flight control systems, and related aerospace and marine equipment.

CAPABILITY. Dowty Canada Electronics Ltd's activities are divided into the following major areas

- **Aerospace** - The design and manufacture of aircraft sub-systems and black boxes. This is typified by the microprocessor-based "steer-by-wire" equipment presently in production as standard equipment on the Canadair Challenger 601, the deHavilland Dash 8, and Gulfstream IV Aircraft. Dowty Canada Electronics Ltd is approved to AQAP 4 levels which have direct equivalency to MIL-Q-9858.

- **Build-To-Print** - Dowty Canada Electronics Ltd is engaged in high quality build-to-print for a number of customers. Products include printed circuit board assembly, wire harnessing, cabinet assembly, test equipment, and testing. The in-house engineering capability enables Dowty Canada Electronics Ltd to offer design, redesign and substitution services on subcontract work. The company's production facility is one of the very few facilities in the world that is fully qualified to the extremely strict US Navy soldering specification WS6536.

AVERAGE WORK FORCE. R&D - 3
Engineers - 4
Technicians - 3
Production - 25
Others - 10

GROSS SALES 1988 - \$3.0M
1989 - \$3.5M

PLANT SIZE: 20,000 sq ft

EQUIPMENT Equipment includes Hollis Wave Soldering Machine, degreasing unit, various R&D and test equipment, and vibration and environmental chambers for engineering, R&D, and manufacturing screen testing.

EXPERIENCE. See Capability Section.

REVISED: Mar 90

DOWTY CANADA Ltd

ADDRESS. 574 Monarch Avenue
Ajax, Ontario
Canada L1S 2G8

CONTACT: Mr Fran Stilwell, Director, Landing Gear Business Development
Tel: (416) 683-3100
Fax: (416) 686-2914

KEYWORDS Actuators, Aircraft Landing Gears, Advanced Materials, Certification Testing, Damping; Electromechanical Design; Helicopter Landing Gears, Hydraulics, Hydromechanical, Integrated Systems Management, Landing Gears, Liquid Springs, Machining, Microprocessor Control Units, Motions Compensation, Shock Mitigation, Steering (Ground) Systems, Steering Systems.

HISTORY. Dowty Canada is a member of Dowty Aerospace North America, a part of the Dowty Group. The group with headquarters in Cheltenham, England, has interests in aerospace, electronic systems, information technology, and polymer engineering

Dowty Canada Ltd has a longstanding reputation as a supplier of state-of-the-art aircraft landing gear, microprocessor-controlled hybrid actuation systems, and industrial and marine hydraulic systems.

CAPABILITY: Dowty provides integrated systems management from concept design to product support of aircraft landing gear systems; microprocessor-controlled ground handling and flight control systems; industrial, marine, and military hybrid actuation systems, and equipment health monitoring, information, and communication systems.

Computer aided design augments our extensive design and development capability and, with CNC manufacturing equipment, ensures the cost effective production of sophisticated products. Ongoing development

projects ensure that Dowty Canada is prepared for future hydraulic, electrohydraulic, mechanical, and electronic controlled actuation and control system needs. Current R&D activities include landing gear studies for soft/rough field usage, advanced material applications, and crash-worthiness features for helicopter landing gears.

AVERAGE WORK FORCE. Design & Development Engineering - 75
Sales & Technical Staff - 35
Quality Control - 35
Operations - 200
Financial & Administration - 30
Total - 375

GROSS SALES: 1989 - \$50M

PLANT SIZE: 12 acres (land)
200,000 sq ft

EQUIPMENT. Dowty Canada maintains an extensive design capability, augmented by an integrated CAD/CAM system and specialized analytical modelling software. Development and certification test facilities include a Cyber II computer for test control and data acquisition; a Honeywell H-TMs 3000 test management system; strength, fatigue, drop, and photo-elastic test rigs; and environmental test chambers. A wide range of state-of-the-art manufacturing equipment ensures cost-effective production of the sophisticated components produced by Dowty Canada. In addition to CAD/CAM, Dowty has implemented an integrated machining cell system linked to a distributive numerical control (DNC) system which provides immediate electronic transfer of data from CAD/CAM direct to the CNC control. Quality assurance and reliability functions are performed in accordance with the standard practices of the aerospace and marine industries. Dowty Canada operates in accordance with Canadian and US military and commercial standards meeting MIL-Q-9858A, AQAP-1, AQAP-4, AQAP-6, FAA, and DOT requirements.

EXPERIENCE. Since its inception in 1940, Dowty Canada has provided landing gear for many successful commercial and military aircraft, ranging from business jets and commuter transports to military fighters, jet trainers, and helicopters.

Current programs include main and nose landing gears for the Lockheed P-7A US Navy Next Generation Anti-Submarine Warfare Aircraft, the Bell-Boeing V-22 Joint Services Vertical Lift Aircraft, and the Kaman Aerospace USN SH-2F (LAMPS MK1) helicopter. Dowty also supplies outrigger landing gear for the McDonnell Douglas USMC AV-8B V/STOL light attack aircraft.

Dowty Canada currently produces lightweight capstans for the Bell Aerospace US Navy Aircushion Landing Craft (LCAC), and supplies the hydraulic power pack and constant tension winch for the DAF Indal Helicopter Recovery Assist, Securing and Traversing (RAST) system, which is in service with the US, Japanese, and Canadian navies.

Dowty has developed aircraft ground steer-by-wire systems. Dowty designs and manufactures the microprocessor-based electronic control unit, the hybrid electrohydraulic actuation, and the landing gear, providing complete systems management throughout the project. The steer-by-wire systems have been developed for deHavilland Dash 8, Canadair CL-601, and Gulfstream G-IV aircraft.

Dowty Canada was selected by Boeing Helicopter to design, develop, and produce landing gear control units for the V-22 FSD program. The system performs several functions related to landing gear and door sequencing during retraction and lowering of the gears, interfaces with the on-board computer, and is equipped with built-in test equipment (BITE) for self test and maintenance activities.

REVISED: Mar 90

DSMA INTERNATIONAL Inc

ADDRESS: 6655 Airport Road
Mississauga, (Toronto), Ontario
Canada L4V 1V8

CONTACT: Dr Gary M Elfstrom, PEng, Director of Aerospace Business Development
Tel: (416) 672-3800
Fax: (416) 672-3507

KEYWORDS: Aerodynamic Test Facilities, Calibration, Climatic Test Facilities, Design Services, Engineering Services, Environmental Testing, Instrumentation, Test Facilities, Test Management, Testing (Environmental); Wind Tunnels; Acoustic Chambers.

HISTORY: Dilworth, Secord, Meagher and Associates Limited, established in 1952, is the parent company for a group of companies that provides high-technology test facilities to the aerospace, automotive, and petroleum industries. Test facilities can be provided on either an engineering or turnkey design and supply basis.

CAPABILITY: DSMA's primary business focus lies in the engineering and turnkey supply of custom-design test and research facilities for a worldwide client base in the automotive, petroleum (fuels and lubricants), and aerospace communities.

The range of DSMA test facility projects is comprised, for the most part, of two families of wind tunnel design:

- Aerodynamic Test Facilities – various types of wind tunnel designs to support full- and reduced-scale investigations into the aerodynamic (and aero-acoustic) characteristics of airborne and surface vehicles
- Climatic Test Facilities – various types of controlled-environment wind tunnel and test chamber designs to support product development investigations involving the thermodynamics of surface vehicles at the whole vehicle and component-test levels.

In addition to these two families of facilities, DSMA has also executed test facility projects having to do with acoustics, altitude effects, hydrodynamics, icing, and boundary layer aerodynamics for aircraft, vehicles, buildings, and structures.

Most recently, they have gone on to develop a significant new product to satisfy the ever-increasing demand for test facility automation: a unique and proprietary software system, registered under the "TALENT" trade name. TALENT represents the culmination of an intensive DSMA development program. In all, eight turnkey projects have been supplied with TALENT, plus two other fully automated systems (NASA Ames and NLR).

AVERAGE WORK FORCE: PhD – 4
Engineers – 40
Others – 60

GROSS SALES: 1988 – \$20.1M
1989 – \$19.7M

PLANT SIZE: 27,000 sq ft

EXPERIENCE: As stated above, DSMA's experience and expertise lies in the engineering and turnkey supply of custom-design test and research facilities. They serve a worldwide market having worked on 150 test facility projects for clients in 18 countries. The company has a net capital value of \$600 million.

REVISED: Mar 90

DY-4 SYSTEMS Inc

ADDRESS: 21 Fitzgerald Road
Nepean, Ontario
Canada K2H 9J4

CONTACT: Mr John Beaven, VP of Marketing
Tel: (613) 596-9911
Fax: (613) 596-0574

KEYWORDS: Computers, Avionics Computers, 1553 Data Bus, Radar Processing, Graphics Subsystems, ATC, C3 Systems, Relational Processors; Systems Integration, VME Computer Modules.

HISTORY: DY-4 Systems Inc is a Canadian-owned manufacturer of high-performance VME bus computer modules and system level products for commercial, civil, and military applications. Formed in 1979, the company has expanded rapidly based on strong engineering design and system integration talent, and a high-quality manufacturing process. The company has sales offices located in Ottawa, Canada, Campbell, California, Fountain Valley, California, Westford, Massachusetts, Aarhus, Denmark, and Sydney, Australia.

CAPABILITY: The board-level products, which the company has developed and manufactures to commercial as well as MIL-SPEC levels, are based on the industry standard VME bus architecture using 68000/10 (16-bit), 68020 (32-bit), and 68030 processor family. The product line includes a wide selection of processor, memory, and intelligent disk and tape controllers, as well as intelligent I/O controller and chassis systems, again for rugged commercial and military applications. High-level languages are offered including Ada.

In addition to the above products, the company provides potential customers extensive engineering capabilities ranging from system integration of chassis and board-level products to system software development. DY-4 has related experience in graphics subsystems for C3 and air traffic management. DY-4's manufacturing has a Quality Assurance Program equivalent to Z-299.1 MIL-Q-9858A.

AVERAGE WORK FORCE: Employees – 210

GROSS SALES: 1988 – \$19.0M
1989 – \$18.2M

PLANT SIZE: 40,000 sq ft

EQUIPMENT: Extensive LAN-based development systems, CAD, and semi-automatic production facilities.

EXPERIENCE: The DY-4 present customer base for commercial and military VME programs includes Raytheon (Canadian Radar Modernization Program), Magnavox (Air Traffic Control), Terma Elektronik (C3 Systems and Graphic Display), Picker International (Army Mash Units), Hughes Aircraft, Boeing Aerospace, Rockwell (computer systems for Royal Australian Navy Submarines), and Honeywell Ltd (integrated navy system and sonar stabilization).

DY-4 has designed a ruggedized shipboard command and control system for the Danish Navy, an airborne management computer was designed for a system integrator for the Canadian Armed Forces Navigation Trainer, and a similar system for a remote sensing ice reconnaissance aircraft is under contract with Canadian Armed Forces for a militarized reconfiguration multiprocessor for ship computing system.

REVISED: Mar 90

EASTERN PRECISION CASTING Inc

ADDRESS: 820 Deslauriers St
Montreal, Quebec
Canada H4N 1X1

CONTACT: Mr Peter Tam, Marketing Coordinator
Tel: (514) 337-9600
Fax: (514) 745-1780

KEYWORDS: Investment Castings, Castings, Ferrous Castings; Non-Ferrous Castings.

HISTORY: Eastern Precision Casting Inc (EPC) is a Canadian-owned small business established in 1976. They are a precision investment casting house in both ferrous and non-ferrous alloys utilizing the lost wax process. Since 1986, EPC has owned Eastern Aerocast Inc (formerly Supreca Inc) in Montreal, Quebec.

CAPABILITY: EPC produces investment castings to their customers drawing and specifications, and their clients are from the following fields of endeavor: aerospace, aircraft, missile, microwave, engines, and commercial. Their capabilities include ferrous castings to 20" x 20" x 20" and non-ferrous castings to 50" x 30" x 20".

AVERAGE WORK FORCE: Engineering – 18
Quality Control – 7
Sales & Marketing – 5
Production – 120

GROSS SALES: 1988 – \$7.5M
1989 – \$7.9M

PLANT SIZE: 45,000 sq ft

EQUIPMENT. Equipment includes furnaces, robots, wax injection machines to 100 tons, x-ray, spectrometer, tensile testing M/C, coordinate measuring M/C, hardness testing M/C, zygo, and heat treatment capability for non-ferrous.

EXPERIENCE: Approximately 80% of their production is for the US market. US clients include Colt Industries, Lockheed, McDonnell Douglas, Raytheon, Hughes Aircraft, Singer, TRW, Litton Industries, Martin Marietta, Rockwell International, and Bendix. Canadian clients include Canadair, Pratt & Whitney, Canadian Marconi, Northern Telecom, Garrett Manufacturing, Spar Aerospace, and RCA.

REVISED: Mar 90

EBCO AEROSPACE INDUSTRIES Inc **(Division of Ebco Industries Ltd)**

ADDRESS: 8510 River Road
Delta, British Columbia
Canada V4G 1B5

CONTACT Mr Helmut Eppich, Chairman and Chief Executive Officer
Mr David Belanger, Vice President and General Manager
Tel: (604) 946-4900
Fax: (604) 946-4671

KEYWORDS: Coatings; Die Fabrication; Extended Length Machining; Heat Treating; Hydraulics; Machining; Mechanical Assembly; Metalworking; Precision Machining; Repair Capability Machining; Stamping; Titanium, Tooling.

HISTORY: Ebco Aerospace Industries Inc is a wholly Canadian-owned company formed in 1983 and is a division of Ebco Industries Ltd, formed in 1956. Ebco Aerospace recently moved into a newly constructed 43,000 sq ft state-of-the-art DNC machining facility to support the precision manufacturing needs of the North American aerospace industry. The Ebco Group has over 900 employees and 500,000 sq ft of manufacturing facilities. In addition to Aerospace, the operating divisions of Ebco Industries are Light Metal Fabrication, Metal Finishing, Tool and Die, and Heavy Fabrication and Machining. Within the Ebco Group are companies manufacturing office systems, commercial and institutional furniture, automotive products, and electronic data collection systems.

CAPABILITY: Ebco Aerospace machine tools operate under direct numerical control (DNC). The system includes IGES capability, allowing Ebco customers to off-load high priority machined parts at short notice by furnishing cutter instruction on electronic media.

Special machine tools acquired during 1987 are listed below.

- Four, three-spindle, 5-axis SNK gantry profilers, numerically controlled, Fanuc 12M control system – 30 HP spindle drives separately equipped for steel and aluminum, 40" between spindles, 20 – 4,000 rpm speed range (steel), 1,000 – 7,000 rpm speed range (aluminum) – 500 lbs/ft² maximum load on work mounting surface – 110" x-axis travel, 164" y-axis travel, 28" z-axis travel, ±25° spindle swivel (a-axis) and tilt (b-axis) – work mounting surfaces: 160" width, 190.3' length
- SNK Type FSP 100-V five-axis machining center, numerically controlled, Fanuc 11M control system – 25 HP spindle drive, 20 – 5,000 rpm speed range – two pallet, size: 30.4" x 39.4" maximum pallet capacity 5,500 lb – maximum distance, pallet surface to spindle center, spindle horizontal: 55.1", spindle vertical: 39.4 – 60" x-axis travel; 56.3" y-axis travel, 55.1" z-axis travel, +30° to -120° spindle tilt (a-axis); 360° table rotation (c-axis).

- SNK gantry type single spindle five-axis profiler, numerically controlled, Fanuc 12M control system – 30 HP spindle drive, 20-4,000 rpm speed range – 500 lbs/ft² maximum load on work mounting surface – 240" x-axis travel; 56" y-axis travel; 28" z-axis travel; ±25° spindle swivel (a-axis) and tilt (b-axis) – work mounting surfaces: 48" width, 240" length (354" bed length).

- Mori Seiki Model TL-5B 3000 turret lathe, numerically controlled, Fanuc control system – 25HP spindle drive, 12 – 1,400 rpm speed range – 5,000 lb capacity – 14" diameter swing over carriage, 100" between centers, eight indexing stations on turret

AVERAGE WORK FORCE 70 (Aerospace Division)
900 (Ebco Industries))

GROSS SALES: No data.

PLANT SIZE. 43,000 sq ft (Aerospace Center on 52 acres for future development)

EQUIPMENT. In addition to the equipment described above, EBCO maintains the following special purpose equipment:

- Cincinnati Millicron machining center, 3-axis
- Giddings & Lewis machining center, 3-axis
- Automated UT inspection (immersion type)
- Mitutoyo coordinate measuring machine
- Automated PT inspection
- Other heavy conventional manufacturing capability
- Cranes: 2 x 10 Tons (Aerospace)
- Computers: DEC Micravax II/VMS (McDonnell Douglas) Unigraphics/DC-135 CAD/CAM

EXPERIENCE. Ebco's customers include The Boeing Co, Boeing de-lavilland, Canadair, Bristol Aerospace, Hooker Chemical, University of British Columbia, Robbins Company, Lockheed Petroleum Services and McDonnell Douglas.

REVISED: Apr 90

EDA INSTRUMENTS Inc

ADDRESS: 4 Thorncliffe Park Drive
Toronto, Ontario
Canada M4H 1H1

CONTACT: Mr Bruce Brydon, Vice President
Tel: (416) 425-7800
Fax: (416) 425-8135

KEYWORDS Artillery Battery Communication Systems; Packet Switching Multiplexors, Switches (X 25), Network Control Systems; Communication System Design, Communication System Consulting; R&O (Communications).

HISTORY EDA Instruments Inc is a Canadian-owned, high-technology company engaged in military and commercial electronic, design, consulting, and manufacture. The company was founded in 1977. It has a US sales office in Orlando, Florida.

CAPABILITY EDA Instruments Inc is involved in the design and manufacture of electronic systems for use in military communications and commercial data communications. Its field artillery battery communications system is used by the Department of National Defence of Canada. The company has an AQAP-4 manufacturing facility. The company performs subassembly manufacturing and test and also repair and overhaul of its equipment. The company's capabilities cover the broad areas of engineering including hardware, software, and system design and development; systems management; product assurance; production; repair and overhaul, quality assurance; documentation; and training and after-sales support.

AVERAGE WORK FORCE: Engineers – 9
Technologists – 12
Others – 40

GROSS SALES: 1989 - \$5.5M

PLANT SIZE: 20,000 sq ft

EQUIPMENT: Computer systems include IBM PC ATs.

EXPERIENCE Present customers include the Department of National Defence (Canada), Computer Sciences Corporation (US), Union Carbide (US), Revenue Canada (Customs and Excise), as well as distributors in western Europe, Australia, New Zealand, east Asia, and South America.

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EDO CANADA Ltd

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Calgary, Alberta
Canada T2E 0A7

CONTACT: Fraser B Rea, Director, Business Development
Tel: (403) 569-5400
Fax: (403) 569-5499

KEYWORDS: Components (Composite); Ceramics (Structural); Composite Materials; Electronic Survey Equipment, Structural Ceramics, Filament Wound Aerospace Components, Hand-lay Aerospace Components.

HISTORY: EDO Canada Ltd (ECL) was established in Calgary in 1979 as JMR Instruments Canada Ltd. In 1983 the company was purchased by the EDO Corporation of New York, and in 1987 a 40% equity share of EDO Canada Ltd was acquired by the Alberta Government. ECL is a high-technology company specializing in survey electronics, advanced materials, and net-shape structural ceramics.

CAPABILITY: In less than a decade, ECL has grown from a specialized manufacturer of electronic survey equipment to a multi-faceted company servicing a broad range of electronic and aerospace requirements. While ECL's electronics capability has been the cornerstone of ECL, the advanced materials divisions have established niches in the space, aerospace, and commercial utilities industries.

The Electronics Division was initially concerned with developing and manufacturing survey instrumentation utilizing the NNSS Navy Navigational Satellite System. The division has since pioneered some of the most sophisticated and accurate navigation and positioning equipment available today.

The ANSYN-501 Marine Integrated Navigation System is a low-cost system that combines the inputs of GPS (Global Positioning System), Transit, Omega, Loran-C, Speedlog, and Gyro sensors to provide optimum positions for marine surface vessels. It is currently being installed on Canada's Navy surface fleet. The Multi-Sensor Integrated Navigation System (MSINS) is an extension of the ANSYN-501. It provides a "stand alone" navigation system complete with sensor box, processor, and optional display.

The ANURN-502 Automatic Position Correlator was designed to provide real-time navigation and positioning for land-based electronic warfare vehicles and is also currently in use by the Canadian Armed Forces. EDO Canada's most recent land-based program, the Primary Land Arctic Navigation System (PLANS), is an integrated system for arctic defense vehicles. PLANS integrates Transit, GPS, magnetometer, speedometer, and gyro sensors to provide the vehicle operator with instantaneous azimuth and position, relative motion, and true velocity.

In addition to EDO Canada's own GPS product line, a recent agreement with one of North America's leading manufacturers of GPS equipment, Ashtech Inc., has secured EDO Canada Ltd as the exclusive Canadian distributor of the Ashtech XII line of GPS equipment.

In 1987 EDO Canada Ltd diversified into engineered materials and established capabilities for filament winding and hand lay-up of composite materials and high pressure injection molding techniques for structural ceramics. EDO Canada's contracts to manufacture 480 gallon external

fuel tanks for the CF-18 fighter aircraft and to develop space antenna reflectors for commercial communications satellites have established a complete range of in-house design, design engineering, production, and quality assurance capabilities.

ECL's high-pressure injection molding process allows for the fabrication of net shape, complex ceramic shapes that can be used as alternatives to a broad range of components traditionally manufactured from materials such as metal alloys. These components not only offer the improved properties of advanced ceramic materials, such as strength retention at elevated temperatures, high melting points, and extreme hardness, but through injection molding, EDO Canada Ltd has virtually eliminated the cost-prohibitive machining process.

The innovative technology and commercial success of ECL is the result of an experienced team of engineers and technicians, in-house R&D facilities, complete design and manufacturing capabilities, and a NATO-standard quality assurance program.

AVERAGE WORK FORCE: PhD - 2
Engs - 10
Others - 48

GROSS SALES: 1988 - \$3.0M

PLANT SIZE: 60,000 sq ft

EQUIPMENT. *Materials (composites):* 2 winding machines, 2 computer controlled 2' x 9' x 8 500°F ovens, 1 10' x 46' autoclave; cold storage, extractor; spray booth; cranes; rotation fixtures; solvent recovery system; dust extraction system; drill, route, and grind area; tooling/machine shop, vacuum pump, clean room, mechanical/chemical test laboratory area; barricaded test cells.

Materials (ceramics): physical properties lab, sintering capabilities to controlled tolerance and density, atmospheric kiln, production and development molding machines; 3-D CAD system.

Electronics: Complete assembly and testing areas, in-house software/hardware development support for 68000, 68020, 68030, Z80, NSC-800, 8080/8085/8088-8086/80286 microprocessors, in-house AUTOCAD software, electrostatic discharge (ESD) protection.

EXPERIENCE: Present customers include the Canadian Armed Forces, the Canadian Airforce, the Canadian Navy, and the Canadian Department of Communications.

REVISED: Mar 90

EMCON EMANATION CONTROL Ltd

ADDRESS: 14 Colonnade Road
Nepean, Ontario
Canada K2E 7M6

CONTACT: Steven Baker, Vice President Marketing
Tel: (613) 723-1838
Fax: (613) 723-2752

KEYWORDS. Systems Engineering-TEMPEST, TEMPEST Engineering, Fiber Optic Communication Systems, Communications Systems Engineering, Secure Communications Devices, TEMPEST Testing, Consulting (TEMPEST), RF Testing (NACSIM), RF Shielding, Shielded Cabinets, Tamper Resistant Cabinets, Power Filtering, Signal Line Filtering, EMI/RFI Shielding, Hardening, EMP, TEMPEST Manufacturing, Workstations (TEMPEST), Switches (TEMPEST/Fiber Optic), Local Area Networks (TEMPEST/Fiber Optic).

HISTORY Emcon Ltd is a Canadian-owned, high technology, electronics company founded in 1985. The company provides products and services for use in the processing and communication of classified information. We operate nationwide and in the USA.

CAPABILITY. Emcon Ltd is primarily involved in the design and development of TEMPEST electronic devices and fiber optic communications systems. The company has the largest private-sector expertise in TEMPEST

engineering in Canada. Emcon has state-of-the-art TEMPEST engineering, testing, and manufacturing facilities, which are used to develop new TEMPEST products for most computer and communications equipment manufacturers in Canada. Few, if any, Canadian government departments involved in military, para-military, security, or security-related functions have not benefitted from products and services provided by Emcon since 1985. Emcon has installed fiber optic communications systems across Canada and at Canadian Forces bases in West Germany. Currently, the company is developing solutions for workstations and X-window terminals needed for use in reduced TEMPEST applications, as well as engineering and integrating fiber optic local area networks for high speed, high performance applications. Emcon specializes in the use of RF-shielded cabinets in TEMPEST situations to house commercial equipments that do not require frequent access by the user. They design and manufacture TEMPEST and tamper-resistant equipment enclosure systems that comply with DND's Inter-service CIS/09/7 and the Canadian Government's Inter-departmental CID/09/12 requirements for shielding effectiveness and tamper resistance. Their capabilities cover the broad areas of engineering, including circuit and system design, systems management, product assurance, production, quality assurance, documentation, and training. Emcon typically designs and manufactures products that are qualified to US and Canadian Government MIL standards, i.e., MIL-STD 16400, MIL-STD 461, NACSIM 5100A, AMSG 788, and AQAP-1.

AVERAGE WORK FORCE: PhD - 1
MASC - 1
Engs - 5
Others - 20

GROSS SALES: 1988 - \$5.3M
1989 - \$7.1M

PLANT SIZE: 17,000 sq ft

EQUIPMENT: Complete electronic, electrical, and mechanical design facility. In-house computer systems include IBM, Apollo, and Apple. Test facility includes Watkins Johnson receiver, downconverter, wide band adapter and signal monitor, Electrometrics non-tunable receiver, HP signal generator, Tektronix spectrum analyzer, full range of antennas, PLISN, filters, coupling transformers, RF voltmeters, and Tektronix oscilloscope.

EXPERIENCE: Present customers include various departments in the Canadian Government and industries in both Canada and the US. A partial list of customers includes DND, RCMP, CSIS, CSE, External Affairs, IBM, DEC, Northern Telecom, Newbridge Networks, Timeplex, MITEL, Rockwell, ESL/TRW, CDC, Macdonald Dettwiler, NCR, UNYSIS, Emergency Planning Canada, and CRC.

REVISED: Mar 90

EPIC DATA Inc

ADDRESS: 7280 River Road
Richmond, British Columbia
Canada V6X 1X5

CONTACT: Mr Neil McDonnell, Director of Marketing
Tel: (604) 273-9146
Fax: (604) 273-1830

KEYWORDS: Component/System Testing, Controllers; Custom Hardware; Custom Software, Data Acquisition, Microprocessors, Modular Design, Portable Terminals; Software Services, Solid State Devices, Standard Products; Terminals; Testing/Test Equipment; Turnkey Data Collection Systems, Security Management Systems; Consulting; Systems Analysis & Design, Site Preparation; Installation; Education, Service & Support.

HISTORY: Epic Data Sales Ltd is a member of the Canadian-owned Ebco group of companies. Ebco identified a need for an automated data collection system for labor and material and incorporated Epic Data in 1974 to manufacture and market the product

CAPABILITY: Epic Data designs and manufactures microprocessor-based data collection systems. Terminals and controllers incorporated in modular hardware and software design ensure both reliability and

flexibility. Terminal users on the factory floor, in the office, and in other environments find the terminals easy and straight forward to operate

Epic Data offers a wide range of data collection terminals. The Low Cost Terminal (LCT) is a small, inexpensive data collection terminal that accepts bar code and keyboard input. The 200 series Portable Terminals accept bar code wand, keyboard, and laser scanner input. The 300 series Dual Function Terminals are powerful, microprocessor-based terminals for bar code and magnetic stripe data collection. The 500 series Independent Terminals provide on-line data collection via terminals that guarantee continuous data collection by gathering and storing data if the control unit is busy or unavailable. Finally, the Telephone Data Terminal (TDT) is a microprocessor-based terminal capable of collecting and transmitting data to a host computer via a standard telephone network.

Epic also manufactures the 1648 series of system controllers to interface between the collection terminals and the system's host computer. Epic Data's line of controllers range from the Host Programmable Control Unit-Minimum configuration capable of managing a network of up to 24 terminals on 2 party lines, to the Network Control Unit, capable of managing a network of up to 1536 terminals on 16 party lines.

Epic's expertise lies in adapting microprocessor technology to the broad field of data collection. The capabilities of the assembly group include PCB component insertion, wave soldering and board cleaning, terminal assembly, cable fabrication, and metallized foil label making. The Manufacturing Test Group performs board and terminal burn-in and test. Customer orders are fully configured in house and go through a full systems test prior to shipping. Multi-stage quality monitoring is provided by an independent QA/QC Group. Epic Data's manufacturing facility is augmented by its parent company, Ebco Industries Ltd. Ebco provides capabilities in the areas of metal fabrication, painting, and tool and die making.

In addition to the manufacture of data collection hardware and operating software, Epic Data is able to offer complementary application software products.

AVERAGE WORK FORCE: Total - 200

GROSS SALES: 1986 - \$31.2M
1987 - \$21.6M

PLANT SIZE: 14,500 sq ft

EQUIPMENT: Epic Data's equipment includes wave solder machine, aqueous PCB washer and contaminant monitor, PCB bake chamber and PCBA dry chamber, component prep machines, semi-automatic DIP inserter; metallized foil processing equipment; automatic shorts tester; cable tester; PCB burn-in rack; walk-in terminal burn-in chamber; drill presses; flat cable press; crimp terminal machines; STP dedicated testers for PCBAs; and miscellaneous meters, scopes, analyzers, and debugging testers.

EXPERIENCE: Epic Data is a pioneer and leader in the design and manufacture of data collection equipment and software. Epic's base of over 500 customers includes General Electric, Hughes Aircraft, LTV Aerospace, DEC, General Dynamics, Litton, Lockheed, Martin Marietta, Monsanto, Northrop, Mexican Government, Canadian Government, and Motorola.

REVISED: Mar 90

ERNST LEITZ CANADA Ltd

ADDRESS: 328 Ellen St
Midland, Ontario
Canada L4R 2H2

CONTACT: Mr John Klie, Manager, Instruments Group
Tel: (705) 526-5401
Fax: (705) 526-5831

KEYWORDS: Electro-Optics, Fire Control Optics, Image Processing, Laser Optics, Lenses (Reconnaissance), Lenses (Underwater), Optical Coatings, Optical Research & Development, Optics Infrared, Optics

Visual, Optomechanical Precision Assemblies, Photography, Remote Sensing, Sights, Laser Radar, Multi-wave Band Imaging, Muzzle Reference Systems.

HISTORY: Leitz Canada was established in Midland, Ontario, in 1952 as a subsidiary of Ernst Leitz Wetzlar GmbH, West Germany. At that time, the company commenced operations with twelve personnel, and since then, the company has expanded through internal growth in three major business areas:

- Photography
- Custom commercial optical assemblies and systems
- Military electro-optical instruments and systems

In 1987, the Wild and Leitz companies combined to form the Wild Leitz Group, and Leitz Canada was assigned to the Special Products Division to take advantage of the full range of capabilities within the group for defense electro-optical systems in the Canadian marketplace.

CAPABILITY: Ernst Leitz Canada is a well-integrated firm specializing in the design and manufacture of complex, precision opto-mechanical and electro-optical assemblies and systems for the commercial and government markets built under the Leitz, ELCAN, and Wild Leitz trade names. From a comprehensive suite of computerized optical design and CAD programs in the engineering departments, to complete opto-mechanical testing capabilities, Leitz is equipped with the most modern equipment to undertake both large-volume production and prototype quantities for conventional, state-of-the-art, and research programs. Full machining capabilities, surface treatment, optical grinding and polishing of spherical, aspherical and plano optics, in glass, metal and infrared materials, microprocessor-controlled thin-film coating facilities, and optical measurement and testing apparatus enable Leitz to undertake the fabrication, assembly, and test of this complex optical equipment. New developments are underway in optical data storage equipment for harsh environments and military systems, infrared coating, and weight reduction techniques using plastics.

In addition, the resources and technology of Wild and Leitz are available to be applied or transferred as necessary. Special capabilities exist in the fields of glass and optical materials, optical lenses, seekers, night vision, helicopter sighting systems, target acquisition equipment, and gun alignment and control systems.

AVERAGE WORK FORCE: Professionals – 50
Total – 375

GROSS SALES: 1988 – \$28.0M
1989 – \$30.0M

PLANT SIZE: 130,000 sq ft

EQUIPMENT: Ernst Leitz' equipment includes in-house IBM and HP computing hardware, Eros Modulation Transfer Function measuring benches, environmental test facilities, CNC machining centers, full set of optical measuring equipment including Tropel digital measuring interferometer, microprocessor-controlled coating chambers, and Leitz 3-axis coordinate measuring machine.

EXPERIENCE: Ernst Leitz' experience is outlined in four different areas:

- Photography/Reconnaissance – design and manufacture of the Leica M camera and a family of photographic lenses for the Leica M and R cameras; production of cameras for instrumentation and event recording; design and manufacture of lenses used in underwater applications for military and commercial applications; and design and fabrication of lenses used in aerial reconnaissance, earth resources, and space application with focal lengths from 18mm to 900mm.
- Custom Commercial Assemblies and Systems – optics for optical data storage, x-ray equipment, image intensifiers and microfilm systems; complex periscope viewing systems for use in high radiation nuclear environments; and industrial, electro-optical equipment including laser scanners, non-contact inspection devices and quality control instruments.
- Other Military Applications – design and manufacture of visual and infrared systems for guidance and fire control applications

including tank fire control and muzzle reference systems, binoculars, rifle sights, weapon sights, range finders (optical and laser), HUD and HDD optics, and night vision products, both image intensification and far infrared equipment.

- Research and Development – optical countermeasures, optical data storage for harsh environments, thermal imaging, image intensification, and optics for space.

REVISED: Mar 90

ESNA FASTENERS Inc (Les Attaches ESNA Inc)

ADDRESS: 2214 46th Ave
Lachine, Quebec
Canada H8T 2P3

CONTACT: Mr James Campbell
Tel: (514) 631-9013
Fax: (514) 631-5641

KEYWORDS: Fasteners (Industrial); Nylon Insert Fasteners; Parts Supplier; Nuts (Metal).

HISTORY: ESNA Fasteners Inc is a Canadian Corporation owned by Harvard Industries, Farmingdale, New Jersey, and is a part of ESNA Division located in Union, New Jersey. ESNA Fasteners Inc was an independent business named A J Campbell Limited until it was bought in the late 60s by ESNA Corp (Incorporated 1934). At approximately the same time, ESNA Corp was bought by Amerace Corp and held to April 1985, when ESNA Division was sold to Harvard Industries.

CAPABILITY: ESNA Fasteners Inc acts basically as a Canadian distributor of fasteners for its US owner manufacturer and industrial parts purchased from overseas and other US manufacturers. The company's basic strength is in marketing, sales, stocking, and distribution to the Canadian market. However, it has the technical, management, and manufacturing support of the rest of the division, which has two plants: Industrial Fasteners in Pocahontas, Arkansas, and Aerospace Products in Union, New Jersey. Also an extensive R&D facility is located in Union, New Jersey. ESNA Division is 70% aerospace and 30% industrial. ESNA is known throughout the world for its quality and special applications ability. All quality records are traced and documented throughout the process. All material is certified. Approximately 11% of US business is with the US Government.

AVERAGE WORK FORCE: 11

GROSS SALES: 1988 – \$2.2M
1989 – \$2.5M

PLANT SIZE: 5,000 sq ft

EQUIPMENT: Various warehousing and material handling equipment and an IBM System 36 computer.

EXPERIENCE: Present customers include the Canadian Government, Railroad, Pratt Whitney, Canadian, Boeing, and Rolls Royce.

REVISED: Mar 90

ETM INDUSTRIES INC

ADDRESS: PO Box 610
266 Hall Avenue E
Renfrew, Ontario
Canada K7V 2E4

CONTACT: Mr Robert Graham, Vice President
Tel: (613) 432-6136
Fax: (613) 432-9547

KEYWORDS. Automotive Components, CAM, CNC Machining, Components (Aerospace), Components (Automotive), Fixtures (Machining), Moldings (Plastic), Plastic Molds, Plastic Moldings, Electronics (Precision Parts), Machining, Nuclear Industry (Machining), Precision Assembly, Precision Machining, Structural Fitting (Helicopters), Turbine Engine Components.

HISTORY. Privately owned business started in 1977 as Ed's Tool & Machine. Primarily involved in tool and die operations, industrial service, and manufacturing plastic injection molds.

Expanded into CNC machining in 1986 and today operates on a two-shift basis.

Plastic injection molding operations started in-house in 1988.

Company name changed to ETM Industries Inc in January 1989.

CAPABILITY. Broad range of machining services from one-of prototypes to multiyear contracts involving thousands of parts for automotive and aerospace customers demanding close tolerance workmanship. ETM specializes in:

- Custom mold design and manufacture.
- Custom injection molding.
- CAD/CAM programming, custom inspection service.

AVERAGE WORK FORCE: 28

GROSS SALES: 1988 - \$1.0M
1989 - \$1.2M

PLANT SIZE: 8,000 sq ft manufacturing

EQUIPMENT. Complete range of CNC machinery. Four vertical spindle machining centres - two with automatic pallet changers. Two CNC turning centres. Many programs involve statistical process control (SPC) inspection. Complete toolroom with lathes, milling machines with digital read out, grinders, EDM machine, heat treatment facilities. Plastic injection molding machines have 40 ton and 120 ton capacity. Inspection facility equipped with coordinate measuring machine. Established quality assurance program at AQAP-4 level.

EXPERIENCE. Customers include Boeing Canada, Atomic Energy of Canada, Leigh Instruments, Honeywell, Sperry Aerospace Division, Westinghouse Canada Inc - Turbine & Generator Division, Canada Post Corp, Newbridge, Grenville Castings Ltd, Northern Telecom, and Canadian Astronautics Ltd.

REVISED: Mar 90

EXCALIBUR SYSTEMS LIMITED

ADDRESS. 215 Terrence Matthews Crescent
Kanata, Ontario
Canada K2M 1X5

CONTACT. Mr Maurice C Herbert, President
Tel: (613) 591-6000
Fax: (613) 591-6001

KEYWORDS. Electronic Warfare, RF Subsystems, Simulators, Training, Test Equipment, Automatic Test Equipment, Validation Equipment, Radar, RF Simulation, System Studies, System Definition, Millimetric Systems, Microwave Systems, Real-time Systems.

HISTORY. Excalibur is a wholly-owned, Canadian company founded in 1988 to design, develop, and manufacture very fast, real-time, modular ESM and radar simulators and automatic test equipment. All research and development effort costs and operating expenses have been funded through contracting revenues, private venture capital, and bank financing.

CAPABILITY. The Excalibur range of ESM simulators are gaining recognition as high-fidelity, easily programmable, and versatile units. The systems are designed around an open architecture and can be modularly adapted to respond to individual customer's specifications. Emphasis is placed upon the use of high-quality components and the second-sourcing of critical parts. Priority is given to configuration control, to ensure revision match, and to strict quality control plans and procedures to maintain quality in both design and manufacture.

Excalibur provides custom designed automatic test equipment to satisfy customers' particular requirements. Pre-designed generic software modules allow cost effective systems to be provided with a minimum of development effort.

AVERAGE WORK FORCE: 10

GROSS SALES: No data.

PLANT SIZE: 3500 sq ft

EQUIPMENT. General electronic laboratory test, validation, and simulation equipment.

EXPERIENCE. The principals at excalibur have many year's combined experience in real-time, EW simulator systems. They bring together experience from the specialized disciplines of radar, microwave, and millimetric system design; remote sensing systems; airborne systems integration, space borne systems, aerospace systems engineering, systems definition; real-time processing; and multi-processor design.

REVISED: Apr 90

EXPRO CHEMICAL PRODUCTS Inc

ADDRESS: PO Box 5520
Valleyfield, Quebec
Canada J6S 4V9

CONTACT Mr D Tresidder, Vice President Sales and Marketing
Tel: (514) 371-5520
Fax: (514) 371-5535

KEYWORDS: A-3; A-4; A-5; Armament; C-4; Chemistry; Composition B, Demolition Block, Double Base; Explosives, High Explosives; Nitrocellulose; Propellants; RDX; Single Base; Triple Base

HISTORY. Expro Chemical Products Inc (formerly Valleyfield Chemical Products Corp) was started in 1940 and has been operating continuously ever since. The complex has undergone two multi-million dollar modernization programs - the first in 1950-1952 and the second in 1977-1978. It was incorporated under the former name in 1977. The company changed ownership on 15 March 1982.

CAPABILITY: Expro is a fully integrated commercial and military propellant and explosives complex. It has its own capability to produce nitric acid, nitroglycerine, nitrocellulose, propellants, and RDX. Nitrocellulose is produced by the batch process, utilizing wood pulp of high alpha cellulose content and nitric acid. It also has the capability to produce nitrocellulose from cotton linters. Present plant capacity for nitrocellulose production is 15 million pounds per year.

Expro uses the in-house-produced nitrocellulose in the manufacture of single-base, double-base and triple-base propellants. The former are primarily used in small arms munitions, military or sporting, in medium caliber military ammunition, and in large caliber weapons in multi-perforated form. The double-base product is used mainly for small caliber guns. The plant produces its own nitroglycerine, using the Biazzi Process, for the manufacture of the double- and triple-base propellants. Nitroguanidine for triple-base propellant manufacture is purchased.

Expro produces RDX by the Bachmann Process. It is manufactured to military specifications in various granulations as required. The RDX is mixed with TNT to produce cyclotol. Other products include Composition B, Compositions A-3 and A-4, and Compositions C-4 and A-5. Demolition Block M5-A1 and M112 are also manufactured at the company's facilities.

AVERAGE WORK FORCE: Total - 750

GROSS SALES: No data.

PLANT SIZE: 1,100 acre site

EXPERIENCE: Though its prime client continues to be the Canadian Department of National Defence, Expro is one of the two accredited suppliers of propellant for the US Air Force GAU-8/A weapon system and the US Army 25mm Bushmaster. With respect to the GAU-8 system, Expro supplies Honeywell with both propellant and high explosive (Comp A-4) and Aerojet with Comp A-4. Other major clients in the US include Remington Arms, Aerojet, DuPont, and IMR Powder Inc. HE distribution in US is by direct sales. Expro has received orders for its propellants and explosives from the Netherlands, Belgium, Portugal, Italy, France, Greece, Turkey, Brazil, and Venezuela.

REVISED: Mar 90

EXTEC PRECISION MANUFACTURING

ADDRESS: 21 State Crown Blvd
Scarborough, Ontario
Canada M1V 4B1

CONTACT: Mr Leo Doroniuk, Division Manager
Tel: (416) 297-1621
Fax: (416) 297-1885

KEYWORDS: Machining; Precision Machining; CNC Machining.

HISTORY: Extec is a division of Exco Technologies, which is in its 36th year of business.

CAPABILITY: Extec specializes in the precision machining of weldments, castings, and from solid material. We employ skilled personnel and have the latest CNC and CAD/CAM equipment. Extec services the military, aerospace, nuclear, and general machining markets and complies with the following quality programs: CSAZ299.3, AWAP4/6, MIL-I-45208A, and MIL-STD-45662.

AVERAGE WORK FORCE: 16

GROSS SALES: 1988 - \$3.0M
1989 - \$2.5M

PLANT SIZE: 16,000 sq ft

EQUIPMENT: CNC and CAD/CAM equipment associated with precision machining.

EXPERIENCE: Present customers include Unisys Corp, US, ISC Cardion Electronics, US; Indal Technologies Inc, Mississauga, Canada; and GE Canada, Peterborough, Canada.

REVISED: Mar 90

FAG BEARINGS Ltd

ADDRESS: 801 Ontario St
Stratford, Ontario
Canada N5A 6T2

CONTACT: Mr John Tsaltas, Customer Service, Sales
Tel: (519) 271-3230

KEYWORDS: Anti-Friction Bearings; Bearings, Instrument Bearings, Miniature Bearings, Precision Bearings, Waterpump Shaft Assemblies

HISTORY: FAG Bearing Ltd has been in business since 1883 (Germany). The company is incorporated under the laws of the Dominion of Canada. Branch offices are located in Vancouver, Edmonton, Winnipeg, Sudbury, Toronto, Hamilton, Montreal, and Truro. A US affiliate, FAG Bearings Corp, is located in Stamford, Connecticut.

CAPABILITY: FAG Bearings Ltd is involved in the manufacture of precision ground anti-friction bearings including instrument and miniature bearings, water pump shaft assemblies, and separate aircraft bearing assemblies.

AVERAGE WORK FORCE: Engineering - 26
Production - 650
Admin & others (Stratford) - 195

GROSS SALES: No data.

PLANT SIZE: Manufacturing - 220,000 sq ft
Warehouse - 75,000 sq ft
Engineering - 4,000 sq ft
Laboratory - 2,500 sq ft

EQUIPMENT: FAG Bearings has complete facilities to manufacture precision ground anti-friction bearings from raw materials (bar stock or tubing). Tolerances to ABEC 9. Aircraft bearing production started in 1981 (heat treating, grinding, assembly, etc). They have well equipped heat treating facilities, a metallurgical laboratory, bearing testing facilities (life, noise, torque, etc.), complete clean room (Class IV), assembly for instrument bearings, and separate aircraft assembly. FAG Bearings also has:

- Materials Control Laboratory - Leitz Stereo Microscope and Microscope (mag 1250x); Vickers and Knoop Micro Hardness Tester; Rockwell Hardness Tester; and Eddy Current and Ultrasonic Devices; temperature cycling chamber.
- Heat Treating Furnaces - Vacuum (computer controlled), Batch with Endo Thermic Generators, continuous type (Nitrogen/Methane), induction, salt, and carburizers (pack & gas).
- Sub-Zero Production Chilling Chamber.
- Acid (etching) Room - etching, passivating and black-oxidizing facilities.
- Mass Spectrometer - Leak detector.

EXPERIENCE: FAG Bearing has experience with many US and Canadian companies including Garrett (Airesearch) in Phoenix, Arizona; Bendix Corp at various locations; GE in Wilmington, Massachusetts; Litton Industries at various locations; McDonnell Douglas in Grand Rapids, Michigan; Sperry at various locations; Varian Assoc in Beverly, Massachusetts; Canadian Marconi in Montreal, Quebec; Spar Aerospace in Toronto, Ontario; DISC Defense Industrial Supply Center in Philadelphia, Pennsylvania; Dept of National Defence in Downsview, Ontario; and US Army Aviation in Texarkana, Texas. Final destinations of some contracts include numerous US Air Force bases.

REVISED: Mar 90

FELL-FAB PRODUCTS

ADDRESS: PO Box 3303, Sta C
Hamilton, Ontario
Canada L8H 7L6

CONTACT: Mr Bert Tufts, President
Tel: (416) 560-9230

KEYWORDS: Aircraft Interiors, Soft Armour; Cargo Restraint Systems, Collapsible Storage Containers; Fuel Storage; Water (Potable) Storage; Fabrication (Fabrics); Harnesses; Satellite Insulation; Aviation Seat Covers (Fire-Block); Sewing (Fabric); Sleeping Bags; Storage Systems (Dry & Liquid); Tanks (Collapsible); Tents; Transportation Systems (Dry & Liquid); Webbing; Welding (Fabric); Personal Webbing & Gear.

HISTORY: Fell-Fab was established in 1954 as a two-man company, manufacturing truck tarpaulins. It has evolved into a sophisticated manufacturing facility specializing in textile products with 130 employees, an engineering group, clean room facilities, advanced manufacturing equipment and quality assurance programs that satisfy both military and commercial aviation requirements. Fell-Fab has a wide range of proprietary products related to storage and transportation. Fell-Fab is a privately held Canadian company.

CAPABILITY: Fell-Fab's capabilities include:

- Thermal protection systems for spacecraft. Installations include the interleaves for solar array and multi-layered insulation for the satellite body on the European Olympus satellite program.
- Fire-block seat covers and interiors for aircraft. Fell-Fab equipped the Canadian Department of National Defence (DND) B707 fleet with passenger seat covers and is supplying crew fire-blocked seat covers for the complete Air Canada fleet. Canadair's CL-600 and CL-601 are using Fell-Fab's acoustical and thermal insulation.
- Cargo restraint systems for aircraft, naval vessels and ground vehicles. Fell-Fab supplied the webbing system for DND's C-130 fleet.
- Customs covers. Fell-Fab supplies shipping wing covers to McDonnell Douglas Canada for the protection of the complete wing during transportation to California.
- Military webbing and equipment. Fell-Fab supplies the personal webbing to DND together with specialized equipment such as flight helmet bags, ammunition pouches, body bags and water bottle containers.
- Tents, sleeping bags and ground sheets. Fell-Fab participates in DND's modular tentage system designed for arctic and tropical use. Most protective shelters used by Bell Canada and other public utility companies are provided by Fell-Fab.
- Soft Body Armour. Fell-Fab is an approved vendor to the Royal Canadian Mounted Police for bullet proof vests. Fragmentation jackets also form part of Fell-Fab's capability to DND.
- Antenna covers. Microwave antenna shields protect Andrew equipment around the world.
- Dry and liquid bulk transportation and storage. A range of patented systems allows the utilization of standard collapsible containers for efficient bulk transportation and facilitates the protection and storage of, for example, grains, resins, fuel, and potable water.
- Developed in cooperation with a defence research organization an NBC protective hood for aircraft crews.

AVERAGE WORK FORCE: Engineers - 4
Technicians - 4
Others - 122

GROSS SALES: 1988 - \$5.8M
1989 - \$6.0M

PLANT SIZE: 60,000 sq ft

EQUIPMENT. Comprehensive range of manual and automatic machinery for cutting, sewing, welding and gluing fabric, specialized plastics and composite material. CAD/CAM system with auto cutting and fabrication was installed in late 1987. Clean room facilities.

EXPERIENCE. Over 60% of Fell-Fab's production is exported, primarily to government organizations or large companies, such as airlines in the US. Refer to the capabilities section for experience related to specific product lines.

REVISED: Mar 90

FIELD AVIATION COMPANY Inc

ADDRESS: Head Office
Suite 300
4230 Sherwoodtowne Blvd
Mississauga, Ontario
Canada L4Z 2G6

Government Liaison Office
*Standard Life Building
275 Slater St, Suite 320
Ottawa, Ontario
Canada K1P 5H9

CONTACT. * Mr C H Wilkinson, Manager, Government/
Industry Relations
Tel: (613) 236-9577
Fax: (613) 236-3435

KEYWORDS: Aerial Spray/Fire Bombing; Aerial Survey; Aeronautical Engineering Services; Aircraft Maintenance; Aircraft Parts; Aircraft Sales; Airframe Components, Avionics, Corrosion Control, Hydraulics, Jig Fabrication (Airframe), Modification (Aircraft, Helicopters); Non-Destructive Testing; Painting (Aircraft); R&O (Aircraft, Helicopters); Seat Manufacture (Aircraft); Sheet Metal Fabrication; Spare Parts; Structural Analysis (Aircraft), Survey Systems (Installations), Systems Integration

HISTORY. Field Aviation started in Canadian general aviation in 1947 in Oshawa, Ontario, and expanded to include a western facility in Calgary, Alberta, in 1952. The eastern facility moved to the Toronto airport in 1960. A recent reorganization within the company means Field Aviation is now Canadian-owned, however, they continue an association with the Hunting Group of Companies, in London, England, who retain a minority interest. Navair Limited, included in the Field stable since December 1987, is Field Aviation's avionics arm incorporating their primary avionics sales, service, and installation capability. The company's aircraft parts distribution network was sold in Dec 89, however, it maintains a distribution capability for the Beech aircraft parts, along with other related aircraft spares. The company has five operating arms with names and locations as follows (headquarters italicized)

- Field Aviation East Ltd - *Toronto*, Trenton
- Field Aviation West Ltd - *Calgary*
- Field Aviation Sales Ltd - *Toronto*, Calgary, Ottawa
- Field Aviation Parts Sales Ltd - *Toronto*
- Navair Limited - *Toronto*, Vancouver, Montreal, Ottawa

CAPABILITY. Field Aviation provides a full range of aircraft sales, service, modification, and R&O services to general aviation, regional airlines, corporate aviation departments, and governments. The company is the exclusive Canadian distributor for Beech Aircraft Corporation and provides a full spectrum of Beech and other related aircraft parts from its Toronto facility. Field is also actively involved in the sale and brokering of pre-owned business, commercial, and military aircraft and helicopters in Canada and abroad.

Field West has a high-quality aircraft-painting facility that will accommodate aircraft up to Boeing 737 size.

Field West maintains a complete set of overhaul jigs for the deHavilland Twin Otter and Buffalo aircraft, and for a number of Bell helicopters. The shops have completed numerous conversions of Gulfstream G1s to commuter airliner configuration, and major structural modifications to Convair 580 passenger aircraft to convert them to freighters. A recent hangar acquisition in Calgary has permitted an expansion of Field's R&O activities to include aircraft up to B707 size. In addition, Field West is now manufacturing all parts for the Boeing/deHavilland Buffalo and Canou, and is overhauling airframe components for DND's Boeing 707s.

A seat manufacturing facility in Calgary has provided production seats for the Twin Otter and CASA 212, and has developed custom seats for a number of other aircraft types. It currently produces all seats for the deHavilland Dash-8 production line.

Field's engineering department specializes in custom modification of aircraft. Their custom designs of aerial survey installations and fire bombing systems are flying in many parts of the world, and include both fixed and rotary wing systems. The water pick-up and release system installed on the Canadair CL215 fire bomber is a Field Aviation design. Recent engineering projects include custom design and installation of radar, airways calibration, and remote sensing systems in aircraft up to 50,000 lbs MGTOW.

Specialized expertise exists for repair/modification of all Beech aircraft B707, B737, B727; Twin Otter; Buffalo; Dash 7 and 8; Convair 540/580, 600/640, CC109, SD3-30, SD3-60; Gulfstream G1; Fokker F27/F227;

Lockheed Electra and G130, Mitsubishi M42, DH125, HS748, Bell Helicopters; and the full spectrum of general aviation aircraft.

AVERAGE WORK FORCE: Engineers - 6
Technologists/Design Spec - 17
Others - 570

GROSS SALES: 1988 - \$46M (excluding Navair)
1989 - \$51M (excluding Navair)

PLANT SIZE: 175,000 sq ft (Toronto)
350,000 sq ft (Calgary)

EQUIPMENT: Standard FBO (AVITAT) facilities at Toronto and Calgary for aircraft up to B727 size; manufacturing jigs for Buffalo and Caribou components; major overhaul jigs for Twin Otter, Buffalo, and Bell helicopters; hydraulic test facility; specialized aircraft salvage equipment; modern B737-sized paint shop, precision machine shop, airframe component (sheet metal and specialized welding) overhaul shop, and aircraft seat manufacture and assembly line.

EXPERIENCE Field Aviation's regular customers include the Canadian Department of National Defense, Canadian Department of Transport, Royal Canadian Mounted Police, US Navy, US Army, Massachusetts Institute of Technology, numerous regional airlines, corporate flight departments, and some foreign governments

REVISED: Mar 90

FLEET INDUSTRIES (A Fleet Aerospace Company)

ADDRESS: PO Box 400
Fort Erie, Ontario
Canada L2A 5N3

CONTACT: Mr B M Oakley, Manager Sales and Marketing
Tel: (416) 871-2100
Fax: (416) 871-2722

KEYWORDS: Advanced Composites, Airframe Components, Bonding Capabilities, Radar Antennas, Satellite Structures.

HISTORY: Fleet Industries began operations in Canada in 1930 as Fleet Aircraft of Canada Ltd.

CAPABILITY: Fleet Industries manufactures major components for the prime Canadian and US manufacturers of commercial and military aircraft, helicopters, satellites, and radar systems. Fleet was established in 1930 to design and manufacture aircraft for the world's civilian, transport, and military markets. Between 1930-1950, 4,000 complete aircraft were built at Fleet and flown from the company's 2,400-ft runway.

Today the company concentrates its expertise on the production of major components. Assembly and test methods meet the latest requirements of MIL-Q-9858A and NATO AQAP-1. Fleet's ability to produce quality products on schedule and at competitive prices has won a high reputation for the company in both commercial and defense work.

- **AIRCRAFT:**
 - Boeing - E3A/E6A fin and rudder; Boeing E3A TF33 engine nacelles, 757 APU doors; Boeing A6 Rewing - Flaperon.
 - Boeing (deHavilland) - Dash 8 bonded wing and fuselage panels, inboard and outboard flap assembly, nacelle assembly.
 - Grumman - A6 inboard and outboard flaps and bonded honeycomb assemblies.
 - McDonnell-Douglas - A4E speed brakes and flaps; F/A-18 graphite avionics and gunloader doors; DC-9/MD-80 flaps and ailerons (Canada); DC-10/MD-11 Flapvanes; spoilers, and access doors
- **RADAR:**
 - General Electric - ASR welded antennas Lockheed Electronics - Gun fire control system antennas and cabinets

- Raytheon - Phased array antennas "Pave Paws" & "Cobra Judy," AEGIS.
- Sperry - Gun fire control system antenna and cabinet.

- **SATELLITE:**
 - Hughes Aircraft - Solar panel substrates, Anik C, SBS, NASA, Anik D, GOES/GMS, Westar/Palapa B, Leasat, and AT&T.
 - Spar Aerospace - Bonded panels/structures, Anik C, SBS, Anik D, and Westar, spun/despun assemblies for Brasilsat.

AVERAGE WORK FORCE: Total - 900

GROSS SALES: 1988 - \$57.4M
1989 - \$68.0M

PLANT SIZE: 500,500 sq ft

EQUIPMENT: Fleet Industries' equipment includes Kearney & Trecker, Sundstrand, and Cincinnati numerically controlled equipment, auto-claves, mills, lathes, presses, furnaces, and other special equipment associated with aerospace manufacturers. New bonding facility includes 10' x 31' autoclave, water jet cutting, 5-axis NC core cutting and C-scan inspection equipment.

EXPERIENCE: Facilities and skills have been developed to produce a diversified list of mechanical structures which include radar, sonar, air cushion vehicles, and other defense and commercial assemblies. In the bonding field, Fleet manufactures a wide range of structural components such as antennas, space satellites, electronic cabinets, and other specialized items requiring composite technology.

The list of Fleet's customers reflects a confidence in craftsmanship and support that has lead to long-term relationships. Boeing, deHavilland, General Electric, Grumman, Hughes, Lockheed, McDonnell Douglas, SPAR, Raytheon, Sikorsky, Westinghouse, and many others have experienced the ability of Fleet Industries to produce quality components, on schedule, and within budget.

Fleet Industries' Quality Assurance Program meets the requirements of both Canadian Government specification DND-1015, NATO Spec AQAP-1, and US Mil Spec MIL-Q-9858A. The average ratio of inspection to direct labor is 1:8. To ensure that production of components meets contractual requirements, the Quality Assurance Department reviews and defines product quality with the engineering department, collaborates in the review of specifications, generates quality assurance procedures, reviews quality problems, and effects corrective action and reports on departmental quality performance. Standard mechanical inspection techniques are supplemented by magnafix, fluorescent penetrant, radiography, destruction testing, chemical analysis, and three-axis co-ordinate measuring equipment

REVISED: Mar 90

FLEXIBULB PLASTICS INC

ADDRESS: 9000 Boulevard Parent
PO Box 635
Trois-Rivières, Quebec
Canada G9A 5J3

CONTACT: Mr Pierre Tellier, President
Tel: (819) 374-9250
Fax: (819) 374-5143

KEYWORDS: Plastics Parts; Thermoforming; Vacuum Forming; Injection Molding; Plastic Extrusion; Self-Skinning Foam Products; Aircraft Cabin Interiors; Hi Vacuum Metallizing

HISTORY: Flexibulb is a Canadian-owned, plastics parts manufacturing company founded in 1970. The company is a Canadian-owned plastics parts and composite parts manufacturer. It was acquired in May 1989 from Avcorp Industries Inc.

CAPABILITY: Flexibulb is primarily involved in the fabrication of plastic components as a subcontractor to the prime manufacturers in the

aircraft and ground transportation industries and is approved by Transport Canada to supply plastic parts for the interiors of civil aircraft.

Flexibulb has thermofforming capability and specializes in the transformation of more difficult materials such as polycarbonates and polycarbonate blends, as well as the usual ABS, polyethylene, and acrylic materials. An additional specialization is the capability of producing self-skinning foam products.

AVERAGE WORK FORCE: Production - 25
Admin & Sales - 9

GROSS SALES: 1988 - \$2.4M
1989 - \$2.5M

PLANT SIZE: 28,000 sq ft

EQUIPMENT: Flexibulb's equipment includes 3 single-platen vacuum thermoformers (4'x8, 6'x10, 6'x12), 125 ton self skinning foam injection equipment, and in-house machine shop for tool and die manufacture. The company also has one 6'x10' vacuum metallizing machine.

EXPERIENCE: Flexibulb's principal customers include Canadair, Bombardier, Prevost Car, Via Rail, and Pannac; also, CAE Industries, Bell Helicopters (Textron Ind), MBB, and Bendix/Avelex Inc.

REVISED: Mar 90

FOOTTIT MITCHELL AND ASSOCIATES

ADDRESS: 77 Metcalfe St, Suite #807
Ottawa, Ontario
Canada K1P 5L6

CONTACT: Mr A D Rackow, Vice President
Tel: (613) 563-0236
Fax: (613) 594-8985

KEYWORDS: Consulting, Government Relations, International Trade Relations, Marketing, Systems Planning.

HISTORY: Foottit-Mitchell and Associates is a Canadian owned company founded in 1976 with its office in Ottawa, Ontario. The objectives of the company are two fold:

- To provide an interface between industry and appropriate Canadian Government departments and agencies.
- To provide advice to industry on the establishment of liaison on company-to-company and company-to-government bases.

CAPABILITY: Senior members of the firm have had extensive experience in both Canadian Federal Government and industry in the fields of research, development, marketing and production. Much of this experience has been in the area of US-Canada defense-industrial cooperation. The combination of industrial and government experience is applied to facilitating government-industrial relationships and to company-to-company cooperation in the following areas - Aerospace, Electrical and Electronic, Shipbuilding, Marine Equipment, Transportation, Machinery, General Manufacturing, Government Organization, and Systems Planning and Management Evaluation.

Foottit-Mitchell and Associates, in addition to the professional staff of four, has a number of associates with specialized knowledge who are called in for specific tasks and assignments.

AVERAGE WORK FORCE: Professional - 4
Support Staff - As required

GROSS SALES: No data.

PLANT SIZE: 1,500 sq ft

EXPERIENCE: Foottit-Mitchell and Associates currently provides services to twenty manufacturing companies of which several are located in the US. The provision of these services involves contact with

Canadian Federal Government departments and agencies, particularly with the Departments of National Defence, Transport, Industry, Science, and Technology; Atlantic Canada Opportunities Agency; and Supply and Services, and CIDA. The work with these agencies is conducted at all levels and has been concerned with policy, industrial benefits, customs issues, technology, marketing, funding and contracting.

REVISED: Mar 90

FRONTEC LOGISTICS Corp

ADDRESS: Corporate Headquarters
10035 - 105 Street
Edmonton, Alberta
Canada T5J 2V6

NWS Contract Management Office
130 Slater St, Suite #1300
Ottawa, Ontario
Canada K1P 6E2

CONTACT: Mr George Paicu, President
Tel: (403) 420-7112

KEYWORDS: Logistics Support; Technical Services; Management Support; Power Generators; Communications Networks; Remote Operations; O&M of Airports and Transportation Facilities.

HISTORY: Frontec is a Canadian, technical services and logistics company jointly owned by ATCO Enterprises Ltd and Canadian Utilities Limited. It was founded in 1986 to bring together the combined expertise of the ATCO/CU group in the areas of facilities management, logistics support in remote regions, operation and maintenance, and power generation and transmission. The ATCO/CU group of companies employs 5,500 people and has assets of more than \$3.0B and annual revenues in excess of \$1.5B.

CAPABILITY: Frontec specializes in facilities management, operation and maintenance, logistics support in remote locations, technical services, power generation, airport management and communications networks, and has expertise in computerized management support systems. Frontec also draws on the broad experience and expertise of associated companies such as Alberta Power Limited, Northland Utilities Limited, Yukon Electrical Company Limited, Northwestern Utilities Limited, Canadian Western Natural Gas Company Limited, ATCOR Ltd, ATCO Drilling Inc, and ATCO Structures. Frontec has offices in Edmonton, Ottawa, and Yellowknife in Canada and in Anchorage, Alaska.

AVERAGE WORK FORCE: 175

GROSS SALES: No data.

PLANT SIZE: Not applicable

EQUIPMENT: Not applicable

EXPERIENCE: Under contract to the Canadian Department of National Defence, Frontec operates and maintains the Canadian portion of the long-range radar sites of the new North Warning System. The contract also includes operation and maintenance of the short range radar sites now being constructed. The company operates and maintains through a joint venture with Narwhal Arctic Services five arctic airports.

REVISED: Mar 90

FULL LOTUS MANUFACTURING Inc

ADDRESS: #406-5940 No 6 Road
Richmond, British Columbia
Canada V6V 1Z1

CONTACT: Ms Pam Woodhouse, Sales Coordinator
Mr Don Aney, President
Tel: (604) 270-0188
Fax: (604) 270-6048

KEYWORDS Aircraft Floats, Floats (Aircraft), Inflatable Aircraft Floats, Landing Gear (Retractable).

HISTORY Full Lotus Manufacturing Inc was incorporated in March 1985 with the objective to design and manufacture the world's first inflatable floats for light aircraft.

CAPABILITY Full Lotus Manufacturing Inc is primarily involved in the design, manufacture and production of inflatable float equipment for the aviation industry. Current products include Full Lotus, two-float systems in 12.5 ft (3.8M), 14 ft (4.3m), 16.75 ft (5.1m), and 18 ft (5.5m) lengths, suitable for aircraft with a gross weight of up to 2250 lbs (1019 Kg), available with or without retractable landing gear, and Full Lotus mono-float systems for ultralight and light experimental aircraft, suitable for aircraft with gross weight of up to 1050 lbs (475 kg), available with or without retractable landing gear. Full Lotus inflatable floats offer many advantages over other float systems. They are half the weight of fiberglass floats, stronger than fiberglass or aluminum, flexible and resilient to absorb impacts, have eight airtight compartments per float, provide superior handling characteristics, and fold up for low shipping costs. Other products in development include certified floats for larger aircraft and helicopters.

AVERAGE WORK FORCE: 20

GROSS SALES: No data.

PLANT SIZE: 3,000 sq ft

EQUIPMENT Equipment includes electronic RF welding equipment for welding coated fabrics, assorted sewing and machining equipment, 6000 gallon test tank with crane, and in-house computer systems (IBM & Wang).

EXPERIENCE Full Lotus floats are used by pilots in recreational and commercial operations on all five continents.

REVISED: Mar 90

GANDALF TECHNOLOGIES Inc

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Nepean, Ontario
Canada K2E 7M4

CONTACT: John Wandell, Senior Vice President of Sales-
North America
Tel: (613) 723-6500
Fax: (613) 226-1717

KEYWORDS Modems, Multiplexers; Data Switches; Network Processors; Network Management; Data-Over-Voice Systems; Printed Circuit Boards; Terminal Servers; ISDN Terminal Adapters.

HISTORY Gandalf Technologies Inc was established in Ottawa, Ontario, Canada, in 1970. It is a publicly-held company with operating subsidiaries worldwide. It has two highly-automated manufacturing plants, one at its headquarters campus in Nepean, and one in Warrington, UK. Its US subsidiary, Gandalf Data, Inc, has headquarters in Wheeling, Illinois.

CAPABILITY Gandalf is a leading international designer, manufacturer, and supplier of a broad range of information networking products, systems, and services. These products, systems, and services allow users to communicate between computers from multiple vendors, terminals, and other devices in both local and wide area networks. Gandalf pioneered this non-proprietary approach to networking. In 1972, the company developed, produced, and marketed the first data PBX, the Gandalf PACX (Private Automatic Communications Exchange). The company remains a leader in that market. Principal products are intelligent network processors and data switches, transmission devices such as modems and multiplexers, and sophisticated communications and network management software. Gandalf markets these systems and products separately and also configures them into networks controlled by its Starmaster network processor. The Starmaster system interconnects incompatible, proprietary computer systems into hybrid networks.

Its wide area network architecture accommodates large numbers of geographically-dispersed users.

AVERAGE WORK FORCE: 1,400 worldwide

GROSS SALES: 1988 - \$160.6M
1989 - \$167.4M

PLANT SIZE: Gandalf has a 60,000 sq ft electronic assembly plant, 18,000 sq ft printed circuit board manufacturing plant, and a 100,000 sq ft R&D center, all in Nepean, Ontario. There also is a 150,000 sq ft system test, assembly, and distribution center in Wheeling, Illinois, which includes the company's US technology design center. In addition, the Wheeling facility serves as headquarters for US sales and service. The manufacturing facility in Warrington, UK, has 36,000 sq ft.

EQUIPMENT Complete in-house R&D and production facilities. In-house computer systems include IBM and DEC VAX.

EXPERIENCE Current customers include a number of government agencies and departments, business organizations of all sizes, and educational and financial institutions worldwide. Among the diverse customer base are Wood Gundy (Canadian investment bankers), Public Works Canada, France Telecom, British Telecom, the London Underground, the Dutch PTT (telecommunications authority), Hewlett-Packard, BellSouth, Pacific Bell, University of Chicago, Novell, and McDonnell-Douglas.

REVISED: Mar 90

GARRETT CANADA (Allied-Signal Aerospace Canada)

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KEYWORDS ATC Communications System, Avionics; Beacons; Build-To-Print; Cockpit Displays; Communications; Crash Position Indicator; Digital Electronics; EMI; Emergency Locator Beacons; Environmental Control; Environmental Instruments; ILS; Measurement & Control Systems; Missile Control Systems; Peripheral Vision Display; Power Supplies; R&O (Avionics); RF Communications; Radio Communication Gear; Regulators (Hi/Lo Voltage); Software Services; Subcontract Manufacturing; Systems Integration; TEMPEST; Test Instrumentation; Testing/Test Equipment; Voltage Transformers.

HISTORY Garrett Canada is a unit of Allied-Signal Canada. The company is supported by the Allied-Signal Aerospace Company's worldwide network of field sales and services offices.

A Garrett office was established in Canada in 1952 to provide sales and services support for Garrett products in Canada. One year later, the company established a repair and overhaul facility near Toronto's international airport and added an engineering department to support this endeavor.

Throughout the 1950s, Garrett expanded its engineering department, added a production department, and began the design and manufacture of ground equipment for the Canadian aircraft industry. In 1961, Garrett Manufacturing Ltd assumed a world product mandate for design, development, and production of electronic temperature controls.

CAPABILITY Backed up now by a quarter-million square feet of modern design, manufacturing, testing, and support facilities, Garrett Canada markets electronic environmental control systems, communications systems, peripheral vision display systems, and subcontract services and employs approximately 1200 people of which 30% are engineering or engineering support staff. Garrett Canada now has six facilities in Rexdale, Ontario.

Garrett Canada's engineering facilities have expanded significantly and their marketing efforts have yielded important accomplishments in all of the company's product lines. Garrett Canada.

- Has developed a new and innovative system controlling the temperature and pressure of aircraft bleed air. The electronic bleed air system promises to increase reliability and fuel economy while reducing weight and maintenance costs.
- Has developed an electro-impulse de-icing system for the leading edge surfaces of aircraft wings, stabilizers, engine cowlings, and inlets.
- Has developed the peripheral vision display system intended to prevent pilot spatial disorientation and reduce cockpit work load.
- Is completing a study of the ICECS (Integrated Closed Loop Environmental Control System) concept for the future aircraft.
- Has developed a portable test system for airport instrument landing systems that require ground inspection, calibration, alignment, and trouble shooting.
- Has designed and developed a missile flight control system.

Garrett Canada is actively engaged in the research and development of control systems, RF communications, analog and digital circuit design, power and hi-speed digital hybrids, and display technology. Approximately 20% of annual sales is spent on research.

Environmental and EMI qualification testing to military/aerospace standards is performed in their government-approved test facility. The facility includes a Canadian government TEMPEST test facility. This facility is staffed to perform tests for equipment accreditation based on compliance with NACSIM 5100. A simple standard quality control system that conforms to NATO AQAP-1 and MIL-Q-9858 is employed.

Electronic Environmental Control Systems (EECS). Garrett Canada EECSs are a major subsystem of the environmental control systems that fly on more than 70 percent of the commercial and military aircraft in the western world. EECSs are used in cabin, cockpit, and compartment air-conditioning systems, wing airframe temperature control systems, window heat control systems, and some liquid coolant systems.

Garrett Canada is under contract to McDonnell Douglas and Boeing to develop and manufacture a new and innovative system controlling the temperature and pressure of aircraft (C-17A, MD-11, 767-300) bleed air. The electronically controlled bleed air system is software adaptable to various engine choices. It promises to increase reliability and fuel economy, while reducing weight and maintenance costs.

In 1989, Garrett Canada was completing a contract sponsored by the Flight Dynamics Laboratory, Aeronautical Systems Division at Wright Patterson AFB, to study and demonstrate the life cycle costs related to advanced digitally controlled Integrated Closed-Loop Environmental Control Systems (ICECS). Research has involved analysis, simulation, and development of a full scale laboratory system. A 54% improvement in fuel consumption and a 20% improvement in life cycle costs are expected with the ICECS.

Garrett Canada is internationally known for its expertise in digital control. The ICECS program further enhances the company's technology base with the implementation of modern control theory techniques within a fully integrated aircraft system. Several advanced digital technologies will also be studied.

Communications Systems Emergency locator beacons developed by Garrett Canada are used throughout the world in military, commercial, and general aviation applications. These low power transmitters automatically provide an emergency homing signal to assist search aircraft to locate an aircraft in distress.

Personal locator beacons and survival radio sets for military users permit two-way voice communications with search aircraft as well as providing an emergency homing signal. These radios are being used by the Canadian Forces and the Swedish Air Force.

VHF/AM single channel transmitters and receivers are produced for civil and military aviation air traffic control communications. Contracts have been received from the Ministry of Transport to update all Canadian air traffic control towers. This type of equipment offers many performance and maintenance features not previously available.

The ILS (Instrument Landing System) test set is a new product which performs ILS test procedures more quickly and far from active runways without interrupting air traffic. Using a shoulder strap, the lightweight system is easily carried by the operator. The system is unique in the number of functions it combines from various existing pieces of equipment. This test set's integrated design and digital processor technology ensure significantly reduced maintenance costs while enhancing measurement accuracy.

Peripheral Vision Display. The PVD is a unique flight attitude information indicator designed specifically to combat spatial disorientation and assist in reducing pilot cockpit work load. The PVD operates on the principle that orientation information is sensed by a person's peripheral vision system and processed subconsciously by dedicated areas of the brain. The system was fully operational on the SR 71.

Advanced Systems and Subcontract Manufacturing Service: Garrett Canada's 30 years experience in the design, development, and manufacture of a wide range of aerospace and aerospace-related products provides a sound base for the production of state of the art defense and communication systems. This experience, supported by a modern up to date facility, is also offered for licensed or subcontract manufacturing.

The Advanced Systems capability provided by Garrett Canada has been recognized and proven in the NATO arena through the company's participation in a number of multi national collaborative programs, programs beginning with design, development, production, and system integration, to complete life cycle support and worldwide marketing.

Currently, Garrett Canada is addressing the feasibility, design, and development of tactical missile flight control actuation systems, power supplies, mission electronics, and specialized test equipment for several NATO requirements. In addition to Garrett Canada's participation in the NATO ASRAAM program, the company is teamed in a multi national consortium to address NATO requirements for the NATO anti-air weapons system (NAAWS), 155mm autonomous precision guided munitions (APGM) and the NATO area defence weapon (ADW).

Garrett Canada has contributed to a number of NATO working groups in the pre feasibility studies for NATO LAMS/MFR and the ADW. The company supplies components and assemblies for numerous other defence projects which include the British Aerospace Rapier, GBU 15 glide bomb, ASRAAM, and Chapparral.

AVERAGE WORK FORCE: Total - 1200

GROSS SALES: 1988 - \$110.0M
1989 - \$116.2M

PLANT SIZE. Administration Facilities - 85,000 sq ft
Engineering Facility - 33,000 sq ft
Main Production Plant - 75,000 sq ft
Customer Support Facilities - 34,000 sq ft

EXPERIENCE. Garrett Canada customers are worldwide and include both the commercial and military sectors.

REVISED: May 90

GasTOPS Ltd

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KEYWORDS Automatic Data Acquisition Systems, Control Systems, Data Acquisition, Simulation Consoles, Engine Health Monitoring, Engineering Services; Expert Systems, Gas Path Analysis; Gas Turbine Engines (R&D), Inflight Engine Monitoring, Software Development.

HISTORY GasTOPS Ltd is a Canadian owned company founded in 1979. Capitalization of the company has been through initial investments and retained earnings, and its growth has been steady since operations began.

CAPABILITY GasTOPS Ltd is primarily involved in the design and development of subsystems and support systems for gas turbine based propulsion systems. The company is organized around projects which emphasize R&D. Projects have been concentrated in the fields of engine health monitoring, engine control systems, engine test data systems, and propulsion system simulations. GasTOPS Ltd has developed design/shop facilities to support prototype development. The company offers services in these fields to its customers. In the last several years, the customer base has been almost exclusively military—both naval and airborne.

AVERAGE WORK FORCE PhDs – 3
Engineers – 30
Others – 18

GROSS SALES: 1988 – \$3.0M
1989 – \$3.2M

PLANT SIZE 28,000 sq ft (including 2500 sq ft model shop)

EQUIPMENT Complete mechanical model shop, electronics test equipment, and in-house computer systems and software including 3 MICROVAX systems and 11 PC systems.

EXPERIENCE Present customers include engine manufacturers, control system manufacturers, and various departments in the Canadian Government including the Navy and the Air Force. GasTOPS Ltd is an R&D company devoted to engineering development of prototypes. Cooperative projects with manufacturers are preferred.

REVISED: Mar 90

GE CANADA Inc

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Fax: (416) 858-5612

Mr J R (John) Hawkes, Manager-GE Aircraft Engines
Canada
Tel: (416) 858-5479
Fax: (416) 858-5612/5222

Mr Ronald (Ron) Swarbrick, Manager-Electro Optics
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Fax: (514) 424-3411/3413

KEYWORDS: Development and Manufacture, RF Communications, VHF; UHF, Digital Carrier Modulation; Spread Spectrum; Voice and Signal Processing, Scrambling, Correlative and Error Correcting Coding, Electro Optics, Emitters and Detectors, Defense Electronics, R&O (Electronics); R&O (Engines), Industrial Benefits, Aircraft Engines, Jet Engines, Components (Engines)

HISTORY GE Canada Aerospace Related Operations includes four operating components and an affiliated component. These are Electronic Systems, Electronic Services, Aircraft Engines and Aeroderivatives, Industrial Benefits Management, and Electro Optics.

The Electronic Systems engineering laboratory is located at the GE Canada Inc corporate headquarters in Mississauga, Ontario. The lab was established in 1962 to investigate and develop methods of radar signal processing. By the late 60s, the focus had shifted to the study

of spread spectrum communications, and since then has concentrated on special purpose, sophisticated communication equipment.

The Electronics Service operation is located very close to a Canadian Forces Supply Depot in Toronto. The facility was established in 1967 as the GE Aerospace Electronics Service Depot (AESD), and over the years has become a recognized expert in field service and depot level maintenance. Organized as the wholly-owned GE Canada subsidiary, Genelcom, from 1974 to 1989, the operation is now formally known as GE Aerospace-Electronic Service Programs.

The Aircraft Engine operations began with the decision by the Canadian Government to purchase the McDonnell Douglas CF-18 as the new fighter aircraft. Since then, GE Canada has supplied all of the engines and supported spare parts procurement through offices at GE Canada headquarters. In addition, a plant in Bromont, Quebec, was opened to manufacture blades and vanes for GE jet engines worldwide. The sale of aeroderivative engines in Canada began with compressor pumping stations in the oil and gas industry and more recently included the sale of LM2500 engines to the Canadian Navy for use in the Canadian Patrol Frigate.

The Industrial Benefits Management group was formed when GE Canada and McDonnell Douglas won the CF-18 order. The group has been involved with meeting the GE corporate commitment of over \$1 billion in offsets. The group has expanded its expertise in the industrial benefits area by taking on management responsibility for offset commitments in medical systems, aerospace, mobile communications, and a host of other fields both on behalf of GE and on behalf of third party interests.

Electro Optics is located in a state-of-the-art building in Vaudreuil, Quebec, and houses advanced manufacturing facilities for high-end production of laser emitters and detectors. These products are largely exported to aerospace companies around the world involved in advanced military projects. The facility came to GE Canada along with the purchase of RCA by GE Canada's parent, the General Electric Company of Fairfield, Connecticut.

CAPABILITY: The Electronic Systems group specializes in the design, development, and manufacture of special purpose communications equipment and systems. A major strength is in the area of digital carrier modulation designs, specifically custom built, direct sequence spread spectrum work. Projects are performed in close liaison with the customer, and all aspects of the design process are provided, from the initial feasibility study and definition stage through development to small quantity production.

The Electronics Service Program specializes in the repair, overhaul, and technical support of military electronic equipment for both domestic and international customers. Additional capabilities encompass the design, development, and custom manufacturing and modification of defense electronics, including the provision of technical investigations and studies. Quality assurance procedures used are approved by the Canadian Government to the requirements of NATO specification AQAP-1. A wide range of technical services including field service representatives, complete technical data support, training, in-house test and calibration, as well as installation, operations, and maintenance of radar equipment and facilities is also provided.

Both Electronic Systems and Electronic Services are supported by dedicated ILS, contract, finance, and marketing staff. GE Aerospace Canada also markets the full range of GE Aerospace products and services to the Canadian Government.

The Aircraft Engine operations offer field service representatives, limited manufacturing capability, R&O by subcontract, parts procurement, and a variety of assembly capabilities.

The Industrial Benefits group maintains an up-to-date database of Canadian suppliers in dozens of different product areas, cross-referenced by size, capability, and geographic region.

Electro Optics specializes in the design, development, and manufacture of high-quality laser emitters and detectors for use in military and space applications. The manufacturing facility, built in 1986, features the latest in design and manufacturing tooling for this type of industry. The plant is fully qualified and performs to AQAP-1 specifications.

AVERAGE WORK FORCE Engineers - 47
Technologists - 44
Technicians - 106
Others - 830

GROSS SALES. 1988 - \$155M
1989 - \$182M

PLANT SIZE. 4,000 sq ft (Electronic Systems)
20,000 sq ft (Electronic Service)
120,000 sq ft (Aircraft Engines)
100,000 sq ft (Electro Optics)

EQUIPMENT: The lab is equipped with CAE/CAD, RF test and measurement instrumentation. Electronic Services has a wide variety of specialized equipment including an approved test equipment standards lab, automated test equipment, and a specialized custom manufacturing, assembly, and test facility.

Aircraft Engines has supported development of test cells and a specialized assembly facility in Montreal for the Canadian Navy's fleet of LM2500s.

The Bromont facility is a world class manufacturing plant, representing an investment of some \$100 million, and is one of the first in the GE system to incorporate the latest in computer integrated manufacturing including robotics, computerized controllers, and multi-operation technology.

Electro Optics also has a world class facility of 100,000 sq ft including 30,000 sq ft of class 10,000 clean rooms and 3500 sq ft of class 1000 clean rooms. State-of-the-art equipment includes all equipment required for production, characterization, and testing of electro-optical semiconductor components and subsystems.

EXPERIENCE: Lab customers are predominantly Canadian federal and provincial governments. Electronics Services has performed repair and overhaul (R&O) and specialized MILSPEC manufacturing for over thirty-seven years. Major users have been DND, MOT, DOT, and the USAF. In addition, they have manufactured low volume, highly specialized products for Hughes Aircraft, Lockheed, and the governments of India, Chile, and Ecuador. Other specialized refurbishment of radar systems is being performed for the UN.

Electro Optics has produced products for the US market, Europe, and the Far East. Customers have included Loral, Matra, Martin Marietta, McDonnell Douglas, Hughes, Raytheon, and other companies involved in military and space applications.

Aircraft Engines has mainly marketed to the Department of National Defence on the CF-18 and the Canadian Patrol Frigate Program. Additional customers have been in the oil and gas industry and in the power generation business.

REVISED. Apr 90

GENERAL MOTORS OF CANADA Ltd (Diesel Division)

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KEYWORDS: Air Defense Vehicle, Amphibious Vehicles, Anti-Tank Vehicle, Armoured Vehicles, Assault Gun Vehicle, Command & Control Vehicle, Fire Support Vehicle, GP Armoured Vehicles, Ground Transportation, Hybrid Mobile Protected Weapon System, LVTP7 Upgrades, Light Armoured Vehicles, Locomotives, Logistics Vehicle, M113 Upgrades, Maintenance Recovery Vehicle, Mine Clearance System Kit, Mobile Electronic Warfare Support System, Mortar Vehicle, Personnel Carrier, Recovery Vehicle, Transport System, Ungunned Weapon Station

HISTORY: Diesel Division, General Motors of Canada Ltd, was established in 1949 for the manufacture of diesel-electric locomotives. Diesel Division is a division of General Motors of Canada Ltd, which is a wholly-owned subsidiary of General Motors Corporation.

CAPABILITY: Diesel Division is primarily involved in the engineering and manufacture of diesel-electric locomotives, transit buses, and military vehicles. They have advanced skills and techniques in shearing, forming, fabricating, and welding of large and complex steel components. They are fully qualified military vehicle prime contractors for the Canadian and US Air Forces and the US Army.

AVERAGE WORK FORCE: Engineers - 150
Others - 1850

GROSS SALES. 1988 - \$428M
1989 - \$806M

PLANT SIZE: 1,400,000 sq ft (spread over 4 major plants)

EXPERIENCE: Diesel Division is under contract with the US Marine Corps to deliver 759 8x8 wheeled light armored vehicles (LAV). Four hundred and twenty-two of these vehicles will carry a two man, 25 MM turret. The remaining vehicles include logistics, recovery, mortar, command & control, and anti-tank. Under a separate contract, they have provided 12 mobile electronic warfare support system (MEWSS) variants of the LAV. An assault gun vehicle and an air defense vehicle are two additional variants which the USMC have commenced R&D on. Delivery of the LAV commenced in October, 1983, and was completed in 1988.

Diesel Division's 8x8 LAV has recently been selected by the Canadian Forces as the primary training vehicle to equip four new reserve training centres. Approximately 200 systems will be procured for deliveries in 1990/91.

In 1986, the USAF selected the logistics version of the USMC light armoured vehicle for the MARV/SMUD (mobile armoured reconnaissance vehicle/stand off munitions disrupter). An R&D contract was let for two prototype MARV vehicles. Diesel Division teamed with SACO, the winning SMUD contractor, for the R&D phase of this program. The two R&D vehicles will complete tests in 1990. Deliveries of production quantities are waiting funding approval.

In 1989, Diesel Division teamed with TRW for the US Army NBCRS program. Two prototype NBCRS vehicles based on the 8x8 LAV were delivered for the run off. Decision on this program is expected in Mar 90.

The US Army 82nd Airborne is currently evaluating the 8x8 LAV for their use. Sixteen LAV vehicles have been leased from the USMC for this purpose. Four of the USMC LAVs were attached to the 82nd Airborne during Operation Jes and Carsen.

In the Fall of 1982, Diesel Division completed the delivery of 491 6x6 armored vehicles general purpose (AVGP) to the Canadian Armed Forces. They were supplied in three variants: a personnel carrier, a fire support vehicle, and a maintenance recovery vehicle.

Diesel Division is presently under contract to produce 75 mine clearance system kits (MCSK) for interface onto the USMC's LVTP7's. There is an option for 55 additional kits.

Diesel Division has also been under contract with the US Navy for a design study for a hybrid mobile protected weapon system. In addition, they have also participated in the MX missile carrier program through Delco Electronics and bid on the US Army Infantry Fighting Vehicle Second Source Program. They have produced the Midgetman carrier chassis for the USAF under a LORAL contract.

Diesel Division has designed an upgrade kit for the M113 engineer dozer vehicle adding an auger and a hydraulic tool system. They have received a contract to produce 55 units to the Canadian Forces.

Recently General Motors consolidated the final assembly of all locomotives into the Diesel Division assembly plant, increasing production in the London plant from 5 per day to over 1 per day. More than 4000 locomotives have been delivered to 32 domestic customers, and over 1000 locomotives have been exported to 22 countries.

EQUIPMENT GMC has the following kinds of special equipment.

- CAD/CAM
- Flexible Machining Cell – fully automatic, state-of-the-art, used for subassemblies.
- Slant Bed Lathe – state-of-the-art in numerical control turning equipment.
- Plasma Burner – used for cutting ballistic plate, computer numerically controlled.
- Robotic Welding – majority of hull welding is performed by welding robots.
- X-Rays – facilities for x-raying weld joints on the vehicle hull.
- Machining Centers – state-of-the-art, computer numerically controlled, used for machining entire hulls.

REVISED: Mar 90

GENESIS MICROCIRCUIT Inc

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KEYWORDS Integrated Circuits (Application Specific), Application Specific Integrated Circuits, Data Acquisition, Data Processing, Aircraft Engine Controls, Communications (ASIC)

HISTORY Genesis Microcircuit Inc (GMI) is a Canadian-owned, service-intensive designer and supplier of high-quality, CMOS application specific integrated circuits (ASIC). The company was founded in 1987 by Dr P M Russo and Mr W H White, with emphasis on servicing the quick-turn, low-volume portion of the North American ASIC marketplace.

CAPABILITY GMI is extensively and uniquely dedicated to the design, development, and manufacture of CMOS ASIC products. Through an exclusive arrangement with National Semiconductor of Santa Clara, California (NSC), GMI has access to their state-of-the-art CMOS process. When coupled with the complete capabilities of the fully equipped and staffed Toronto design center, GMI offers an unparalleled level of service and customer design support in the ASIC marketplace. Having NSC as an established and reputable source for leading edge CMOS technology (both 1.0 micron and sub micron), industry standard non-proprietary design automation tools, Gate Array and Standard Cell product families, MIL-STD 883, Class B screening as well as a high-quality, high-volume production source, allows Genesis to further its efforts on providing front-end customer service. The company is in the final planning stages of a state-of-the-art sub micron direct write wafer fab facility, which will be located in suburban Montreal, Quebec, and be operational in the first quarter of 1992. This facility will provide customers access to dramatically shorter foundry turn-around times.

AVERAGE WORK FORCE: PhD – 1
Engs – 14
Others – 5

GROSS SALES: No data

PLANT SIZE: 4,000 sq ft – Toronto Design Center
185,000 sq ft – Montreal Wafer Fab (1992)

EQUIPMENT: Completely equipped ASIC Design Center from MS DOS-based development software to Sun and Mentor workstations with IKOS Hardware Accelerators, industry standard design software and hardware, no proprietary design tools.

EXPERIENCE. The company's customers include General Electric and CAE Electronics.

REVISED: Mar 90

GEOVISION Corp

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KEYWORDS Geographic Information Systems, Automated Mapping, Hydrographic Information System, Utility Outside Plant System, Telephone Outside Plant System; C3 Systems; Data Acquisition; Spatial Modeling; Raster/Image Integration.

HISTORY: GeoVision Corporation is a subsidiary of the Kinburn Technology Corporation, an \$870 million group of companies that includes eight subsidiaries specializing in high-technology system development and integration. The company started in 1976 as the Graphics Division of SHL Systemhouse Inc, now also a Kinburn subsidiary. Based on the success and technological specialization of the division, the separate, privately-owned subsidiary of GeoVision was established by Kinburn in 1984. The company has a US-based subsidiary, GeoVision System Inc, in Englewood, Colorado.

CAPABILITY: GeoVision Corporation specializes in development and marketing of advanced software solutions for input, management, processing, and analysis of geographic-related information. The software meets the needs of local, state, and federal government (civilian and defense), and also the mapping and facilities management requirements of gas, electric, and telephone utilities. In addition, the company provides full implementation, training, support, and consulting services to customers.

AVERAGE WORK FORCE: Master – 22
Bachelors – 57
Others – 56

GROSS SALES: 1988 – \$11.4M
1989 – \$15.2M

PLANT SIZE: 50,803 sq ft

EQUIPMENT Complete software development facility. In-house computer systems include hardware from Sun Microsystems Inc, Digital Equipment Corporation, and IBM Corporation, as well as peripherals from Hewlett-Packard and Calcomp. All software development is done in C programming language under UNIX operating system, using X Windows and Oracle relational database management system.

EXPERIENCE Present customers include utilities companies (typically telephone, gas and electric), federal government agencies (both civilian and defense), and city/country government.

REVISED: Mar 90

GLOBAL THERMOELECTRIC POWER SYSTEMS Ltd

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Canada T0S 0B0

Sales Office
333 50 Ave SE
Calgary, Alberta
Canada T2G 2B3

CONTACT Mr Alan McNaughton, Sales Marketing Manager
Tel: (403) 253-3552
Fax: (403) 253-4607

KEYWORDS: Auxiliary Power Units, Combustion Research, Generators; Portable Power Supplies; Power Sources; Remote Power Supplies; Thermoelectric Generators, Thermoelectric Power Units, Thermoelectric Research; Unattended Power Supplies.

HISTORY. Global Thermoelectric Power Systems Ltd is a privately-held Canadian corporation. It is the successor to the 3M Company in the manufacturing of thermoelectric products, and in the research and development of thermoelectric science and technology. The 3M Company's involvement in thermoelectrics dates from the early 1950s and culminated in a line of commercial generators, as well as radioisotope-fueled generators built for the Apollo moon missions.

Global's facilities opened in 1975, and since that time, the number of employees has grown to 52 and plant size has been enlarged to present 77,000 sq ft.

Global's corporate mission is the continuing application of thermoelectrics to industrial and military products. Global's industrial remote generator systems are operating in more than 47 countries around the world.

New thermoelectric products are being developed, and Global continues to specialize in the design and manufacture of thermoelectric power sources which meet unique demands reliably and cost effectively.

CAPABILITY During the past decade Global has conducted an extensive number of research and development programs. The unique goals of these programs have enabled Global to develop an expertise in new multi-fuel burner systems, thermoelectric metallurgy, and thermoelectric converter design.

Specific development objectives include the development of liquid multi-fuel generators, thermoelectric-powered heaters with self-sustaining capabilities, 600 watt and 2000 watt thermoelectric converters, and large thermoelectric modules for waste heat utilization projects.

Global's projects include 120 watt Manpack Generator, a lightweight unit capable of operating on diesel, kerosene, jet, or gasoline fuels. It is inaudible in field conditions and will operate unattended for periods only limited by fuel supply. As the only moving parts are two small DC motors, the unit requires no operational maintenance. Its simple, one-switch operation and multi-fuel capability make it an ideal power source for operating tactical communication, computers, and other electronic equipment, in addition to field battery charging. Clean heat from the unit can be utilized for heating of shelters, tents, helicopters, etc.

AVERAGE WORK FORCE Engineers - 8
Others - 44

GROSS SALES: 1988 - \$5.8M
1989 - \$4.5M

PLANT SIZE: 77,000 sq ft

EQUIPMENT. Global maintains complete production facilities at its Bassano headquarters. The machine, sheet metal, and welding shops have full capabilities. Equipment includes CNC lathes, surface grinders, mills, a CNC machining center, NC shears and punches, and MIG/TIG welders. The semiconductor thermoelectric materials and hermetically-sealed power units are also manufactured entirely on site.

Global's Quality Assurance Department is equipped with the latest, computer-aided, three-axis coordinate measuring machine. The facilities are presently able to meet MIL-145203 (AQAP-4) quality assurance requirements.

R&D facilities include the latest in electronic test and measurement equipment, two walk-in environmental chambers (-50° to +70°C), and four combustion test rooms.

EXPERIENCE: Global's products are currently in use with a number of defense agencies around the world including the US Air Force, the

US Navy, the US Coast Guard, the UK Royal Navy, and the New Zealand Royal Navy.

REVISED: Mar 90

GODFREY AEROSPACE Inc

ADDRESS 480 Montreal Toronto Blvd
Lachine, Quebec
Canada H8S 1B8

CONTACT Mr A Dale Hunt, Executive Vice President
Tel: (514) 637-1122
Fax: (514) 636-0273

KEYWORDS R&O, Aircraft Accessories, Hydraulic Test Stands, De-icer Platforms, Nitrogen Handling, Compressors, Galley Equipment

HISTORY. Godfrey Aerospace (GA) is a wholly-owned, private Canadian corporation incorporated in May 89 following a management buyout of Godfrey (Montreal) and Carr Tech (Toronto) from Howden Group Canada. The two companies each boast more than 40 years' experience in the aerospace and defense industries. Godfrey Aerospace inherits their careful blend of knowledge and experience to become Canada's leader in its chosen fields. Most recently, GA augmented its R&O capability with the asset acquisition of Temro Aviation Systems Division in Rexdale.

CAPABILITY GA's repair and overhaul capability covers a diversified range of both military and civil land, sea, and airborne equipment, as well as industrial products while design and manufacturing know-how encompasses a variety of sophisticated, specialized equipment. Products serviced include airborne electrical, electronic, hydraulic, pneumatic, cooling, and pressurization accessories; gasoline and diesel engine driven electrical generator sets, ground power units, high pressure breathing and service air compressors, hydraulic test stands, cabin pressure testers, munitions handling equipment, mobile heaters and air conditioners, and microclimate environmental packages.

GA has the capacity to design and manufacture mobile hydraulic test stands, de-icer/maintenance platforms, self-contained nitrogen servicing carts, compressors ranging up to 350 bar/5000 PSIG, and a range of beverage and hot water dispensers.

AVERAGE WORK FORCE 80 (Lachine, Quebec)
40 (Markham, Ontario)
10 (Rexdale, Ontario)

GROSS SALES: \$10-12M annually

PLANT SIZE: 50,000 sq ft (Lachine, Quebec)
44,000 sq ft (Markham, Ontario)
8,000 sq ft (Rexdale, Ontario)

EQUIPMENT: The company maintains extensive pneumatic, electrical and hydraulic test facilities. They perform CSA-approved stainless steel and aluminum welding, and are certified to AQAP1 and Transport Canada standards for aviation accessories.

EXPERIENCE. The company's customers include the Department of National Defence, Supply and Services Canada, Air Wisconsin, American Airlines, Gulfstream, US Air, Oerlikon Aerospace, and Saint John Shipbuilding.

REVISED: May 90

GOVERNMENT CONSULTANTS INTERNATIONAL

ADDRESS: Suite 1300
50 O'Connor Street
Ottawa, Ontario
Canada K1P 6L2

CONTACT: Mr Robert Bolduc, Senior Consultant
Tel: (613) 236-7001
Fax: (613) 236-3496

KEYWORDS Government Relations, Consulting, Sales Representation, Procurement.

HISTORY Government Consultants International (GCI) was established in 1985 and is a private Canadian corporation

CAPABILITY GCI is Canada's leading government relations consulting firm, advising both domestic and international clients on government defence procurement and on the procedures and practices of government departments and agencies.

Professional services provided by GCI include: lobbying, drawing on the experience of GCI members to provide clients with effective advocacy with government; client-specific analysis to identify business opportunities and regulatory obstacles in the government environment, and monitoring public policy changes and assessing their impact on clients.

AVERAGE WORK FORCE: Professional Staff – 10
Research & Support Staff – 10

GROSS SALES: No data.

PLANT SIZE: No data.

EQUIPMENT: In-house equipment includes publishing capability, defence research library, and telecommunications center.

EXPERIENCE: No data.

REVISED: Mar 90

THE H I THOMPSON CO **(Division of Indal Technologies Inc)**

ADDRESS 10 Kingsmill Ave, Box 906
Guelph, Ontario
Canada N1H 6M6

CONTACT Mr D E Roberts, Vice President & General Manager
Tel: (519) 822-6630
Fax: (519) 822-7806

KEYWORDS: Blankets; Foil Heat Shields; Forming (Sheet Metal); Forming (Stainless Foils); Heat Shields; Insulation (Blankets); Insulation Systems; Sewing (Insulation); Sheet Metal Heat Shields; Welding (Sheet Metal); Welding (Stainless Foils).

HISTORY: The H I Thompson Company was founded in 1952 as a subsidiary of a US company to supply high and low temperature insulation to the aerospace industry. In 1965, the company became solely Canadian-owned and in 1989 became part of Indal Technologies Inc. Most of the raw materials consumed are purchased from the US and after fabrication, are sold to Canadian and US customers in the aerospace industry.

CAPABILITY The H I Thompson Company is capable of all thermal calculations, design and fabrication of heat shields, and insulation for gas turbine engines, airframe, and commercial applications. The insulation is generally encased in stainless or inconel foils .002" to .008" thick or sheet metal .010" to .032" thick. The foils or casings are spot or seam welded together to prevent the entry of liquids. The company also has the capability of producing sheet metal weldments, bracketry and assemblies and is qualified for TiG welding to the leading aircraft engine company specifications.

AVERAGE WORK FORCE: Engineers – 4
Others – 38

GROSS SALES: 1988 – \$3.0M
1989 – \$3.0M

PLANT SIZE: 31,000 sq ft

EQUIPMENT: Spot welders – 5 to 50 KVA, seam welders – 5 to 100 KVA, form dies to customer part numbers, 50 to 300 ton presses, various sheet metal fabricating equipment, MIG and TiG welding equipment.

EXPERIENCE: Customers include US and Canadian companies such as Pratt & Whitney Aircraft, deHavilland Aircraft, General Electric, Lockheed, Allison, and Canadair. Services are also provided to US and Canadian Governments such as Oklahoma City Air Logistics Center, San Antonio Air Logistics Center, DISC in Philadelphia, and Department of Supply and Services and Canadian Commercial Corp in Canada.

REVISED: Mar 90

H&S HEAT TREATING **(Division of Phil Dennis Enterprises Limited)**

ADDRESS: PO Box 160
South Street North
Port Robinson, Ontario
Canada L0S 1K0

CONTACT: Mr Chris Dennis, Vice President, Sales
Tel: (416) 384-9355
Fax: (416) 384-9110

KEYWORDS: Heat Treating.

HISTORY: H&S Heat Treating commenced operations in Welland, Ontario, in 1965. The original company was purchased in 1969 by Phil Dennis Enterprises Limited, and operations were consolidated in Port Robinson a few years later.

CAPABILITY: H&S Heat Treating is primarily involved with the heat treatment and cleaning of metal products, both ferrous and non-ferrous, used in such industries as the automotive, agricultural, mining, and transportation. Processes include annealing, stress relieving, normalizing, quench and tempering carburizing, carbo-nitriding, carbon-restoration, fluid bed operations, marquenching, press quenching, cryogenic treatment, etc. Statistical process control techniques are employed throughout operations and quality control programs in place to meet requirements such as AMS 2750, CSA Z299, and MIL-H-6875.

AVERAGE WORK FORCE: Metallurgists (P Eng) – 2
Metallurgical Technologists – 2
Mechanical Technologist – 1
Junior Systems Analyst – 1
Others – 40

GROSS SALES: 1988 – \$4.4M
1989 – \$4.8M

PLANT SIZE: 56,00 sq ft

EQUIPMENT. Various high-volume continuous quench and temper lines, both open fire and controlled atmosphere, up to 4000 lbs/hr capacity. Numerous integral quench controlled atmosphere furnaces and fluidized bed furnaces certified for MIL-H-6875. Large volume cryogenic capacity of parts up to 2000 lbs. Complete laboratory facilities and qualified personnel to support in-house quality control programs and metallurgical consultation services.

EXPERIENCE The company's customers include Brunner Manufacturing, Port Colborne Drop Forge, Sandco Automotive, Seneca Manufacturing, TFI, Welland Forge Limited, General Drop Forge, and Haun Drop Forge.

REVISED: Apr 90

HALEY INDUSTRIES Ltd

ADDRESS. Haley, Ontario
Canada K0J 1Y0

CONTACT: Mr H W Murray, Senior Vice President, Marketing
Tel: (613) 432-8841
Fax: (613) 432-9456

KEYWORDS: Aluminum Sand Castings; Castings; Light Alloy; Magnesium Sand Castings; Sand Casting; Aerospace Sand Castings; Precision Sand Castings; Premium Quality Sand Castings.

HISTORY: Haley Industries Ltd is an aluminum and magnesium aerospace sand casting foundry. The company was originally formed by the Canadian Government in 1952. In 1968, the facility was purchased by private interests. Plant expansions and modernizations took place in 1969 and 1974. In 1981, the company went public in order to finance a further \$7M modernization program. In 1982, a major research and development effort was initiated to produce premium quality aluminum sand castings by means of a low pressure pouring system. On 1 April 1984, Haley Industries purchased Presto Casting Company, located in Glendale, Arizona. During 1986/87, an additional \$8.0M plant expansion was completed increasing the plant production area by 45,000 sq ft. This expansion will enable Haley to produce larger castings as well as participate in a larger way in the airframe structural market.

CAPABILITY: Haley Industries provides aerospace quality light alloy sand castings to an international customer base. Their castings are used in fixed wing and rotary wing aircraft for both military and civil applications. They specialize in producing complex gearbox and transmission castings in both aluminum and magnesium including constant speed drive housings (CSD), auxiliary power unit housings (APU), airframe mounted auxiliary drive system housings (AMADS), main propulsion engine gearbox housings, and main transmission and tail rotor housings for helicopters. In order to supply lubricating oil to the gears in these various housings, Haley developed a sand pipe core process enabling them to cast internal oil passageways in the walls of the casting.

Haley Industries' premium quality casting area permits them to produce castings with superior mechanical properties and excellent radiographic qualities. If required, this also gives them the ability to cast thinner walls with a fine surface finish.

The company is completely self-sufficient for all foundry operations. They have in-house capability for pattern making, heat treating, destructive and non-destructive testing, dimensional inspection, sand testing, spectrographic analysis, and tensile testing with high-temperature capabilities. The extensive use of computers and microprocessors throughout the foundry has enabled Haley to retain its prominent position in the international aerospace foundry industry.

AVERAGE WORK FORCE: Staff - 92
Hourly - 260
Engineers - 18

GROSS SALES: 1988 - \$40.8M
1989 - \$41.0M

PLANT SIZE: 165,000 sq ft

EQUIPMENT: Haley Industries has the most modern foundry equipment available to meet or surpass the exacting aerospace material and design engineering requirements. Specific brochures will be furnished upon request.

EXPERIENCE: Haley Industries has 38 years in operation serving the following customers: Garrett Turbine Engine Co, Avco Lycoming, Boeing Vertol, Bell Helicopter, Detroit Diesel (Allison), General Electric (Engine Group), Hispano Suiza (France), Klockner Humboldt Deutz (Germany), Kaman Aerospace, Litton Precision, Motoren-Und Turbinen-Union (Germany), Pratt & Whitney Aircraft (Hartford, Connecticut), Pratt & Whitney Aircraft of Canada Ltd, Sikorsky Aircraft, Spar Aerospace, Sundstrand Aviation, Westinghouse, Westland Helicopter (England), Fiat Avio (Italy), Agusta SpA (Italy), Aircraft Gear Corp, Hamilton Standard, and Northrop Corp.

REVISED: Mar 90

HALPEN ENGINEERING Inc

ADDRESS: 5350 Timberlea Blvd
Mississauga, Ontario
Canada L4W 2S6

CONTACT: Mr Arthur S Halpenny, President
Tel: (416) 624-2770
Fax: (416) 629-3930

KEYWORDS: Cable Harnesses, Relay and Control Boxes.

HISTORY: Halpen Engineering Inc was established in Apr 71 as a manufacturer's agent and distributor for pumps, nuclear welded component, and specialized industrial lubricants. The 1972, the company added centrifuges, vacuum filters, pressure filters, and electric surface heating systems to their product line.

In 1973, Halpen was awarded a large contract for Ontario Hydro (Lennox GS) and moved to a small plant in Weston, Ontario. The company warehoused and assembled electric tracing cables and control apparatus. In 1975, the company was awarded a \$2 million contract by Canadian Bechtel (agents for Syncrude Canada Limited). In 1978, the company commenced the manufacture of the electric tracing and controls. In 1978, the company entered the US market by forming a subsidiary (Delaware Corp). In 1979, Halpen commenced the manufacture of the pressure filters and vacuum filters under license in Canada. In 1986, Raychem Canada Limited introduced Halpen to the military and aerospace cable harness business.

CAPABILITY: Halpen Engineering manufactures integrated cable harnesses for military and aerospace applications. These range from the simplest light-weight wiring assembly to the most complex engineered multi-conductor harness.

Halpen uses wiring components that are specifically oriented to the requirements of the service for which the harness is designed. For simpler industrial applications, lower cost effective materials are used. For harnesses which are subjected to arduous service conditions, Halpen features RAYCHEM products. RAYCHEM is the world leader in radiation cross-linked materials and components for cable harnessing systems. RAYCHEM's specialty wire and cable, shrink-to-fit tubing, molded parts, and components combine to make a total harnessing system unbeatable in quality and efficiency.

From rough sketches to engineering drawings, Halpen can quickly provide custom designed state-of-the-art interconnect systems, giving the client optimal performance. Halpen field sales engineers offer professional assistance in setting up systems and production requirements. The cable harnesses are tested using the most modern computer driven test equipment which provides hard copy for inspection authorities.

The company also manufactures relay and control boxes made to military and aerospace applications for the NATO forces.

AVERAGE WORK FORCE: Engineers - 3
Others - 15

GROSS SALES: 1988 - \$2.5M
1989 - \$3.0M

PLANT SIZE: 50,000 sq ft

EQUIPMENT: The company maintains a comprehensive set of equipment necessary for the production and test of integrated cable harnesses for military and aerospace applications.

EXPERIENCE: The company's customers include the Canadian Forces, US Army, US Air Force, as well as major prime contracts.

REVISED: May 90

HANDS FIREWORKS Inc

ADDRESS: 221 Nipissing Road
Milton, Ontario
Canada L9T 1R3

*Ottawa Representative
18 Parkland Crescent
Nepean, Ontario
Canada K2H 7W4

CONTACT: *Mr J C Bond, Ottawa Representative
Tel: (613) 820-0190
Fax: (613) 594-8985

KEYWORDS: Ammunition Smoke; Armament; Chemical Airburst Simulators; Chemical Groundburst Simulators; Explosives; Flares; Green Signal; Grenades Smoke, HC Smoke, Hand Grenades Smoke, High Volume Smoke Pot, Igniters, Illumination Signals, Markers, Orange Smoke; Ordnance, Practice Bomb Signal Cartridges; Pyrotechnics, Red Signal; Rocket Igniters; Signal Cartridges; Smoke Pots; Spotting Charges; Yellow Signal.

HISTORY: Hands Fireworks Inc was established in 1977 for the purpose of making domestic display fireworks. Early in World War II, the company converted completely to the manufacture of military pyrotechnics which have been a major product ever since. Hands Fireworks Inc became the primary pyrotechnics and fireworks producer in Canada. During WW II, a wide range of pyrotechnics were manufactured for most of the allied countries and included such items as US BM 8A1 flare, the 4.5" reconnaissance flare, 2" parachute illuminating flares, Verey pistol cartridges of all types, and smoke signals.

CAPABILITY: Hands Fireworks Inc operates from two plants – the main plant at Papineauville, Quebec (between Ottawa and Montreal), and a new plant at Edwardsburgh (50 miles south of Ottawa). The new plant also includes an R&D facility, environmental testing laboratory, quality control laboratory, and the company's central distribution warehouse. The production plants are typical for this industry, being constructed of fire resistant materials and consisting of many individual buildings thereby keeping the amount of explosive, flammable, dangerous, or toxic materials and the number of operators involved to a minimum.

Each specific operation or storage area has been carefully analyzed for degree of hazard and is designed to minimize these hazards by steel or reinforced concrete walls, protective steel guards, remote control of operation, special protective devices such as explosive-activated fire extinguishing equipment, protective screens between buildings, special electrical wiring, etc. The process, materials, quantities of explosive, type of protection, etc., are licensed yearly by the Federal Department of Energy, Mines, and Resources, followed up by frequent plant inspections by this department throughout the year.

The Papineauville facility includes one laboratory/test building, one office building, 50 process buildings, 9 explosive storage magazines, and 32 raw material storage buildings. The fireworks line is completely integrated starting with the basic raw materials. Plastic components which hold the delay charges and bursting charges are purchased from outside sources, but are produced from company molds. The smokeless and black powders used are purchased from outside sources.

AVERAGE WORK FORCE Professionals – 15
Others – 120

GROSS SALES: No data.

PLANT SIZE: 100,000 sq ft (Total at all locations – 120 buildings)

EXPERIENCE: Hands Fireworks Inc has worked very closely with the Department of National Defence (DND) and various Canadian design and development facilities such as the National Research Council; the Defence Research Establishments in Valcartier, Quebec and Suffield, Alberta; and the Chief Inspector of Explosives of the Department of Energy, Mines, and Resources. Development work has been done for the Department of Agriculture. Some major projects have included:

- The design and development of the grenade, hand, smoke (HC), C1A1.
- The design and development of the smoke pot, SC39 and SC390. This long-burning (11 to 18 minutes), high-volume smoke pot was tested by the US Army at Dugway, Utah, and considered to be an acceptable replacement for the M4A2 smoke pot.
- The design and development of the disperser chemical simulant groundburst and disperser chemical simulant airburst, both of which are currently being used by DND.
- The manufacture of the igniter for the Black Brant Rocket.
- The design, development, and production of the signal, illumination 1 1/2" (plastic case) red, yellow, green, etc., for the Canadian Forces.
- The design, development, and manufacture of the Silver Rainmaker shell which was used successfully to produce rainfall to fill reservoirs for irrigation.
- The design, development, and production of the 2 minute Smoke Pot Orange.
- The design and development of self-scuttling Marine Marker.

REVISED: Mar 90

HARBOUR INDUSTRIES (Canada) Ltd

ADDRESS: 1365 Boul Industriel
Farnham, Quebec
Canada J2N 2X3

CONTACT: Mr Mark D Beauchamp, Marketing Manager
Tel: (514) 293-5304
Fax: (514) 293-2421

KEYWORDS: Aerospace Wire; CSA Wire, Cables, Coaxial Cable; Communication Cable; Custom Made Cable, Fire Proof Wire, Flame Proof Wire; Heat Tracer Cable, High Temperature Wire; Hologene Free Wire; Low Hologene Wire, Plenum Cable, QPL Listed Wire; Radiation Resistant Wire; Thermocouple Wire; UL Wire, Wire

HISTORY: Harbour Industries (Canada) Ltd was incorporated in Canada in 1975 and is a wholly-owned subsidiary of Harbour Industries Inc, Shelburne, Vermont. The parent company was incorporated in 1964, and both companies manufacture high-temperature wire and cable.

CAPABILITY: Harbour Industries (Canada) Ltd manufactures high-quality wire and cable to standards such as Mil Spec, CSA, UL, and individual company specifications. The conductors are solid or stranded bare copper, tin, nickel, silver-plated copper, and, on occasion, thermocouple-grade or high-strength alloys. They service the Canadian market and the US market where offset credits are involved in Canadian contracts. The insulations are Teflon, Kapton, Tefzel, Fep, Pfa, and Silicone Rubber.

Harbour Industries (Canada) Ltd has a well-equipped laboratory approved by the US Department of the Navy for QPL testing. Calibration is to MIL-C-45662 and the Quality Control program meets the requirements of MIL-I-45208A and MIL-Q-9858A as well as the NATO APAP-4 requirement. The quality program is registered under CSA quality management registration program and audited regularly by CSA.

AVERAGE WORK FORCE: Engineers – 1
Quality Control – 3
Others – 25

GROSS SALES: 1988 – \$4.8M
1989 – \$5.5M

PLANT SIZE: 25,000 sq ft

EQUIPMENT. Equipment includes Teflon paste and melt extruders, silicone rubber extruders, tape wrappers, striping/printing towers, cablers and braidors, and complete lab and test equipment.

EXPERIENCE. Harbour Industries (Canada) Ltd has experience in all areas of design and manufacture of high quality wire and cables

REVISED: Mar 90

HAWKER SIDDELEY CANADA Inc (Orenda Division)

ADDRESS: 3160 Derry Road East
Mississauga, Ontario
Canada L4T 1A9

CONTACT: Mr C F Varney, Manager, Contracts & Admin
Tel: (416) 677-3250
Fax: (416) 678-1538

KEYWORDS: Airframe Components; Engine Components; Engine Test; Forming; Gas Turbine Components; Heat Treating; Laboratory; Machining; Manuals; Metalworking; Nuclear Reactor Components; Plating; R&O (Engines); Stamping; Welding; Engine R&D; Precision Machining

HISTORY: Hawker Siddeley Canada Inc is a Canadian public company, listed on the stock exchanges in Montreal, Toronto, and Vancouver. The head office is in Toronto and the company normally employs about 7,000 people in divisions across Canada, in the UK, and in the US. The company is engaged mainly in engineering and manufacture of heavy industrial products for domestic and export markets. The Orenda Division was established in 1946 to design, develop, and manufacture jet engines for Canadian fighter aircraft. Orenda has built several thousand gas turbine engines of both its own design and under license for General Electric. They have designed and built the Lance Missile Launcher, conducted nuclear development work, and built parts for the Candu nuclear reactor, and designed and built industrial gas turbines for use in oil pipeline operations and for emergency power units.

CAPABILITY: The Hawker Siddeley Orenda Division's capabilities are outlined below:

- **Manufacturing** – The Orenda Division is now a subcontract manufacturer of major components for aircraft and industrial gas turbines. The facility includes a large machine shop, an extensive sheet metal fabricating shop, a heat treating department, quality assurance to MIL-Q-9858 and AQAP-1, and a comprehensive non-destructive testing department.
- **Repair & Overhaul** – Orenda Division has contracts for the repair and overhaul of aircraft gas turbine engines, J85-15, J85Can40, and the repair and overhaul of the F404. Also overhauled and repaired are industrial gas turbine engines. The plant has facilities for testing all these engines.
- **Research and Development** – The efforts of the R&D group center around improving the durability of expensive and critical components in the F404-GE-400 engine, the J85-CAN-15, and the J85-CAN-40 engines. R&D activity includes development of accurate life assessment techniques for fan, compressor, and turbine blades and discs of gas turbine engines, development of safe and reliable means of extending the life of low cycle fatigue life limited gas turbine discs, development of state-of-the-art NDI techniques for reliable detection of small but dangerous defects in gas turbine blades and discs, enhancing the high cycle fatigue, wear, and fretting fatigue resistance of titanium alloys through ion beam techniques, enhancing the performance of high temperature coatings, development of advanced innovative repair techniques, and improving existing component manufacturing processes. The R&D group cooperates with a number of government laboratories, universities, and other corporations. A national and international network of cooperative research has been created, the benefits of which are passed on to engine operators in the form of high quality solutions to advanced engineering problems.

- **Publications** – The Graphics Department prepares and prints manuals to Department of Defense standards, as well as commercial graphics work.

- **Laboratory** – The laboratory is fully qualified by the Department of National Defence and performs chemical, metallurgical, and mechanical testing and analysis in support of other departments and also for other customers.

AVERAGE WORK FORCE: Technical Staff – 70
Total – 700

GROSS SALES: In excess of \$60M

PLANT SIZE: 440,000 sq ft

EQUIPMENT Machine Shop facilities include turning up to 10 ft dia, NC and CNC machining centers, and EDM broaches. NC programming using access to GE and Sundstrand time-sharing computers. Sheet metal fabricating with mechanical and hydraulic presses to 600 tons; fusion and resistance welding; and facilities for forming, shaping, and joining. There is an environmental room with control of temperature, humidity, and dust. Heat treating is accomplished with atmospheric, inert gas and vacuum furnaces. There are plating and coating facilities. Non-destructive testing by means of infrared, fluorescent penetrant, magnetic particle, X-ray, and ultrasonic equipment. Additionally, there are dynamic rotor balancing machines, gas turbine engine test cells, and facilities for testing fuel systems.

EXPERIENCE: Orenda Division's customers for aeronautical parts and gas turbine repair and overhaul have included Pratt & Whitney, General Electric, Avco Lycoming, McDonnell Douglas, Rolls Royce, Lucas Aerospace; Canadian Department of National Defence; NAMS, the air forces of the Netherlands, Germany, Norway, Belgium, Pakistan, Italy, and US; and the US Army.

REVISED: Mar 90

HERMES ELECTRONICS Ltd

ADDRESS: 40 Atlantic St
Dartmouth, Nova Scotia
Canada B2Y 4A1

CONTACT: (US Contact) Mr J L Fortenberry, Director of
US Business
Tel: (703) 560-3812
Fax: (902) 463-6098

KEYWORDS: Antennas; ASW, Beacons, Communications; Environmental Laboratory, HF Antennas, Sonobuoys.

HISTORY: Hermes is the successor of the Canadian branch of EMI Electronics of the UK. It was established in 1949 and has specialized in anti-submarine warfare products, certain areas of HF communications, and oceans/environmental data systems products.

CAPABILITY. The company's products include.

- **Sonobuoys for ASW Application** – production types include AN/SSQ-53D. Buoys under development include the AN/SSQ-77B. In addition, towed array sensors are produced.
- **Ionospheric Sounding Equipment** – oblique sounding equipment is manufactured and is in service on a worldwide basis. The AN/FPT-11 transmitters, AN/UPR-2 receivers, and their commercial counterparts represent the latest generation of this equipment.
- **HF Antennas** – a unique active broadband aperiodic loop array is produced. Various configurations of this system are in service in twenty-three countries and fifty-four agencies of various governments. A compact system, designated as the OE-316A/TSC-99 Antenna Group, is produced for tactical applications.
- **Moored and Drifting Data Buoy Systems** – buoy vehicles for the collection, recording and retransmission of oceanographic,

meteorological, and environmental data have been developed and systems engineered for government, institutional, and industrial users. Hermes developed the Canadian Ocean Data Systems Buoys for the Canadian Government in 1975.

- Environmental Data Systems – ice stations and automatic weather stations have been developed and manufactured for industrial and government users.

AVERAGE WORK FORCE: 400 (including 65 engineers, technicians, draftsmen, and engineering support staff)

GROSS SALES: 1988 – \$32.4M
1989 – \$33.3M

PLANT SIZE: 137,600 sq ft

EQUIPMENT: Hermes has a fully equipped environmental testing laboratory as well as a comprehensive manufacturing facility. Their environmental laboratory is one of the largest in eastern Canada and contains vibration equipment, humidity and temperature chambers, shock and tensile testers, as well as high pressure testing tanks. The equipment meets the requirements of MIL-STD-810 for environmental test methods. The manufacturing facility is oriented to the high volume production, testing, and integration of electro-mechanical subassemblies. The plant is also equipped with machining facilities to support prototype development manufacturing.

The company's quality control and inspection department has developed and implemented a complete quality assurance program, which ensures quality and compliance to customers' specifications and to military standard. A quality assurance manual in accordance with NATO QA standards and with AQAP-1 defines the QA operations of the company.

EXPERIENCE Hermes is a large-scale producer of sonobuoys for the Canadian and US Governments, as well as other governments. It is the first company to qualify for production of the United States Navy's AN/SSQ 53D DIFAR Sonobuoy. Advanced development programs are continuing in both sonobuoy and towed array products.

REVISED: Mar 90

HILTAP FITTINGS Ltd

ADDRESS: 107, 2750 22nd Street NE
Calgary, Alberta
Canada T2E 7L9

CONTACT: Mr Lee A Krywitsky
Tel: (403) 250-2986
Fax: (403) 291-3592

KEYWORDS: CAD, CAD & Drafting Systems, CAD/CAM; Computer Aided Manufacture, CNC Machining, CNC Milling, CNC Turning, Couplings, Quick Connect Coupling, High Vacuum Couplings, Fluid Couplings

HISTORY: Hiltap is a Canadian-owned, high technology manufacturing and CNC machining company founded in 1985. It was originally owned by Lee Krywitsky and is subsequently owned in part by Northern Transportation Company Ltd, Chauvco Resources Ltd, and Lee Krywitsky.

CAPABILITY: Hiltap Fittings Ltd is primarily involved in the design and manufacture of high-performance couplings that can withstand high/low temperatures and pressures. The couplings can function from ultra-low cryogenic temperature of -250°C to over 1000°C. The couplings offer dead-tight, gasket-free, metal-to-metal sealing (vacuum 29.1" Hg/less than 1x10-9 std ccHc/S). Hiltap couplings have been used in autoclaves for high-temperature composite cures. Hiltap has developed specialized couplings for various hazardous media transfer systems including petrochemicals, chemicals, oxidizers high pressure, hydrocarbons, etc.

The computer aided designs allow rapid prototype generation for specific high/low temperature and pressure (Hiltap) applications. Hiltap is currently developing a quick connect liquid oxygen and nitrogen coupling for NATO.

AVERAGE WORK FORCE: Production – 3
Administrative – 2
Marketing – 1
Engineering – 3
Technicians – 2

GROSS SALES: 1989 – \$300K

PLANT SIZE: 8200 sq ft

EQUIPMENT: In addition to full laboratory equipment, Hiltap has a CNC Mazak Quick Turn 15 machine, a CNC Mazak Vertical Milling Center, and Mitutoyo FJ805 coordinate measuring machine.

EXPERIENCE: Hiltap's customer base includes Boeing Commercial Airplane Company, Boeing Advanced Systems, TV Aircraft Products Group, McDonnell Douglas, Sikorsky, Pratt & Whitney, Hill AFB, and the Canadian Department of National Defence.

REVISED: Apr 90

HONEYWELL Ltd (Sperry Aerospace Division)

ADDRESS: Highway 17, PO Box 1300
Rockland, Ontario
Canada K1A 3A0

CONTACT: Mr Ron Muir, General Manager
Tel: (613) 446-6011
Fax: (613) 446-5905

KEYWORDS: Horizon Reference Systems; ATC; Multiplexers; ILS; Simulators (Marine Diesel), R&O (Avionics), R&O (Radar), Training, Modular Aeronautical Communications Switch.

HISTORY Sperry Aerospace Division of Honeywell Ltd Canada started design, development and manufacturing in Canada in 1951.

CAPABILITY: Sperry Aerospace Division is primarily involved in the design, development, and manufacture of horizon reference systems, air traffic control systems, time division multiplexers, and computer-aided simulated training systems.

Sperry Aerospace Division is also engaged in the logistic support, modification, and repair and overhaul of airborne radar and all types of avionic systems, including air data computers, flight directors and gyros.

The Division's air traffic control systems are fitted at all control towers in Canada. The horizon reference systems are fitted on all helicopter-carrying Canadian destroyers and are presently in quantity production for the USN for use on the LAMPS III Program.

Honeywell's facilities are approved under Canadian Department of National Defence Quality Assurance, and staff resources permit Honeywell to cover the broad areas of integrated logistic support (ILS) systems management, software design, reliability and maintainability analysis, configuration control, and training.

AVERAGE WORK FORCE Engineers – 40
Assembly – 140
Quality Assurance – 15
Field Service & Support – 30
Others – 100

GROSS SALES: 1988 – \$28.5M
1989 – \$32.5M

PLANT SIZE: 39,000 sq ft (Product Support Facility)
53,000 sq ft (Manufacturing Facility)

EQUIPMENT Complete electronic assembly including semi-automatic printed wiring assembly capability.

EXPERIENCE. Sperry Aerospace Division's present customers include the Canadian Government (National Defence, Ministry of Transport/

Coast Guard, and Royal Canadian Mounted Police), the US Government (DOD - Navair), Canadian National Telecommunications, Aeritalia (Italy), and other Canadian and US industries.

REVISED: Mar 90

HOWLAND RUSSELL CONSULTANTS Ltd

ADDRESS: 9 Davidson Drive
Gloucester, Ontario
Canada K1J 6I7

CONTACT: Mr Howland S Russell (Col USAF Ret), President
Tel: (613) 749-0290
Fax: (613) 749-2498

KEYWORDS: Airspace Management; ATC; Planning; Marketing; Subcontractor Search; Proposal Writing; Strategic Planning; Project Management; Industrial Security Evaluation; Industrial Security Training.

HISTORY: Howland Russell Consultants (HRC) was formed and incorporated in 1985 subsequent to a 30-year USAF career. The period from 1976-85 was spent as the Defense and Air Attache to Belgium and then Canada.

CAPABILITY: HRC offers consultant services in the Aerospace market to assist clients in Marketing, Proposals, Project Research, and Strategic Planning. HRC expertise results from both education and practical experience inside and outside the government. Contracted affiliations in both the US and Canada assure the availability of requisite technical skill and the use of tightly focused project manning.

AVERAGE WORK FORCE: MA - 1
BS - 1
BA - 1

GROSS SALES: 1988 - \$75K
1989 - \$200K (est)

PLANT SIZE: No data.

EQUIPMENT: HRC has computerized data banking, word processing, spreadsheet analysis, on-line research and communications, and project accounting equipment.

EXPERIENCE: HRC has successfully assisted Canadian and US contractors in establishing corporate capabilities, organizing proposals and successfully bidding on the North Warning Operations and Maintenance contract. Researching, writing, coordinating and negotiating the Air Carrier industry's positions on a Canadian Government proposal to establish a cost recovery system for air traffic control services. Assisted with the establishment of a corporation offering evaluation and training in all aspects of industrial security.

REVISED: Mar 90

HUGHES AIRCRAFT OF CANADA Ltd

ADDRESS: Suite 1510
55 Metcalfe Street
Ottawa, Ontario
Canada K1P 6L5

CONTACT: Mr Richard N Casale, Vice President
Tel: (613) 236-2322
Fax: (613) 236-3372

KEYWORDS: Systems Analysis, Flight Information Display Systems, ATC Systems.

HISTORY: Hughes Aircraft of Canada Limited is a subsidiary of the Hughes Aircraft Company in California. In 1985, General Motors purchased the Hughes companies bringing Hughes into the GM family of companies. Hughes Canada has its corporate headquarters located

in Calgary, Alberta, with other offices in Ottawa, Ontario, and Richmond, British Columbia.

CAPABILITY: Hughes Aircraft of Canada Limited is involved primarily in the design and manufacture of air traffic control systems.

AVERAGE WORK FORCE: No data

GROSS SALES: No data

PLANT SIZE: No data

EQUIPMENT: No data

EXPERIENCE: No data

REVISED: Mar 90

ICAM TECHNOLOGIES Corp

ADDRESS: 1900 Boul des Sources
Pointe Claire, Quebec
Canada H9R 4Z3

CONTACT: Mr John J Nassr, Jr, Vice President
Tel: (514) 697-8033
Fax: (514) 697-8621

KEYWORDS: APT Processing, CAD, CAM, CL File, CNC Programming, Computer Aided Learning, Consulting (CAD/CAM), Flexible Automated Manufacturing, Integrated CAD/CAM Systems, NC Programming, Plotting Package (Postprocessed); Postprocessor (Multi-Axis); Programming (CNC/NC); Tape Punch System.

HISTORY: ICAM Technologies Corp is a Canadian-owned software development organization specializing in CAD/CAM, NC programming, and production and inventory control. The company was founded in 1971 and is located west of Montreal, Quebec. ICAM has been involved in numerous Canadian commercial and aerospace programs, and has distributed its software products world-wide.

CAPABILITY: ICAM Technologies Corp is primarily involved in the development of CAD/CAM software products, custom NC programming, and consulting for all levels of manufacturing. ICAM software products address both industrial and educational needs in the areas of part design and manufacturing, educating, and training through computer aided learning (CAL), complete CAM systems that include color graphic NC part programming, multiaxis postprocessing for all CAD/CAM systems (custom or generic on PCs to mainframes), APT processing (with sculptured surfaces), plotting and tape punching, integrated CAD/CAM systems, as well as flexible manufacturing systems. ICAM is currently a major supplier to Pratt and Whitney of Hartford, CT, and was Boeing's largest supplier of NC programs and fixture designs for their 767 and 757 airframe programs. ICAM software developments are available on mainframe, mini, and micro computer configurations and allow all manufacturing institutions to increase their productivity to new levels.

AVERAGE WORK FORCE: Engineers and Scientists - 45
Others - 5

GROSS SALES: No data.

EQUIPMENT: In-house computer system includes DEC VAX 11/785, VAX 11/730, HP 9000, Sun Sparcstation, Silicon Graphics, CDC, Apollo, Data General, and various microcomputer configurations. ICAM software is also available for IBM mainframe and mini computers.

EXPERIENCE: ICAM has 19 years experience in software development, NC programming, and consulting services. ICAM's participation in numerous aerospace projects includes the Canadair Challenger, Mercure II, DHC7, DC9 Super 80, DC10, L1011, 707, 747, 757, 767, F15, and NASA Space Shuttle. ICAM is a current supplier to US DOE, McDonnell Douglas, and General Motors.

REVISED: Mar 90

IMP GROUP Ltd (Aerospace Division)

ADDRESS: (Mailing-Head Office)
IMP Group Ltd
2651 Dutch Village Road, Suite 400
Halifax, Nova Scotia
Canada B3L 4T1

(*Point of Contact)
IMP Group Ltd
1545 Carling Ave
Ottawa, Ontario
Canada K1Z 8P9

CONTACT: *Mr H L Conner, Marketing Director
Tel: (613) 729-5210
Fax: (613) 729-1268

KEYWORDS: Airframe Components; Airframe Structures; Avionics; Cable Assemblies; Corrosion Control; Electromagnetic Compatibility; Injection Molding; Machining; Modification (Aircraft); Non-Destructive Testing; Painting (Aircraft); R&O (Aircraft); R&O (Helicopters); Software Services; Structural Analysis; Systems Integration; Systems Testing; Testing (General); Wiring & Tubing.

HISTORY: The company, Industrial Marine Products, was formed in 1967 to purchase the assets of a group of Nova Scotia companies which had been manufacturing foundry and steel fabricated products since 1865. During the next few years, they expanded into the commercial fishing gear and marine equipment areas, and expanded operations into other locations in eastern Canada and the US. In the early 1970s, the company acquired the facilities, equipment, operational management, and work force of a major aircraft company in the Halifax area, and thus, expanded into aircraft overhaul and repair and aerospace manufacturing areas. The current operating divisions of IMP Group are:

- Aerospace Manufacturing
- Aerospace Engineering Services
- Aircraft Repair and Overhaul
- General Aviation Services
- Foundry
- Steel Fabrication & Machine Shop
- Tool and Plastics
- Marine
- Offshore Services
- Hotel
- Properties and Investments
- Research and Development

CAPABILITY IMP Group's aerospace-related capabilities are described in the eight divisions listed below

- **Aerospace Manufacturing Division** – manufactures electronic wiring assemblies for various aircraft and electronics industries. Aerospace metal components are also manufactured
- **Aerospace Engineering Services Division** – offers integrated services for the other aerospace divisions that include repair schemes, corrosion control, weight and balance, modification development, systems installation design, aeronautical engineering, aircraft maintenance, stress analyses, fatigue studies, structural design, electrical and avionics engineering, systems interface design, electromagnetic compatibility testing, systems ground and flight testing, configuration and modification program control, and maintenance and technical publications for military aircraft
- **Aircraft Repair and Overhaul Division** – as the major fixed and rotary wing maintenance facility in eastern Canada, it offers repair and overhaul programs for military and commercial aircraft, as well as a full range of equipment modification
- **General Aviation Services Division** – offers aircraft servicing maintenance, hangarage, crew and passenger lounges for large and small commercial aircraft. This division supports a fleet of

turbo and piston twin engines aircraft for charter anywhere in Canada and the US.

- **Foundry Division** – equipped to produce cast iron, steel, and steel alloy castings up to 2 tons with both cupola and electric induction furnaces.
- **Steel Fabrication and Machine Shop Division** – essentially a custom shop, it is serviced by four 5-ton overhead cranes. Typical products include components for fishing trawlers from steel, stainless steel and aluminum, and a whole range of products, repairs, and modifications for offshore oil industry.
- **Tool and Plastics Division** – manufactures molded plastic parts using the injection molding technique.
- **Research and Development Division** – the primary function is to identify and develop new products and processes related to the continued expansion of the IMP Group and the technical excellence of its products.

AVERAGE WORK FORCE: 1400

GROSS SALES: 1988 – \$150M
1989 – \$150M

PLANT SIZE: Aircraft Repair & Overhaul Division – 200,000 sq ft (4 hangars)
Steel Fabrication & Machine Shop – 14,000 sq ft

EXPERIENCE. IMP Group's aerospace clients include the US Navy (P3 aircraft), Canadian Department of National Defence, Canadianair, USAF, and McDonnell Douglas Canada.

REVISED: Mar 90

INDAL TECHNOLOGIES Inc

ADDRESS: 3570 Hawkestone Road
Mississauga, Ontario
Canada L5C 2V8

CONTACT: Mr Roger Travis, Vice President, Marketing
Tel: (416) 275-5300
(In US call 1-800-263-7340)
Fax: (416) 273-7004

KEYWORDS: Aluminum Fabrication; Antenna Support Structures; Control Systems, Hangars, Helicopter Recovery Assist; ILS Structures; MLS Structures, Machining, Radar, Radar Reflectors; Radomes; Shipboard Support Systems; Specialized Fabrication; Vertical Axis Wind Turbines, Cable and Aircraft Handling Systems, Unmanned Vehicle Support Systems, Sonar Domes, Variable Depth Sonar, Tactical Towed Line Array; Winches; Handling Systems; Heat Shielding Products; Noise Abatement Products.

HISTORY. Indal Technologies Inc (ITI) was originally incorporated under the name Dominion Aluminum Fabricating Ltd in 1951. The company became a member of the Toronto-based Indal Group of companies in 1968 and changed its name to DAF Indal Ltd in 1977, then to Indal Technologies Inc in 1985. In November of 1989, Indal Technologies acquired Fathom Oceanology Limited and the H I Thompson Company to further strengthen and enhance its overall capabilities. Indal Limited is a diversified industrial holding company with 28 operating subsidiaries and divisions in Canada and the US.

CAPABILITY. Since its incorporation, Indal Technologies has grown steadily through the development of facilities which provide a specialty range of engineered products. Indal Technologies maintains a large engineering department staffed by professional engineers of many disciplines including mechanical, electrical, structural, aerodynamics, hydraulic, electro-optics, electronic, hydro-dynamic, maintainability, reliability, safety software, and systems engineering. The company is engaged in many activities involving one or more of these disciplines, and those related to the aerospace industry area as listed below.
(continued on page 95)

Section III

KEYWORD INDEX

KEYWORD

1553 Data Buss
 1553 Data Buss
 A-3
 A-4
 A-5
 Abradable Seals
 Accelerated Weather
 Testing
 Accident Analysis
 Acoustic
 Acoustic Chambers
 Acoustic Emission
 Acoustic Sensing
 Acoustic Sensing
 Acoustic Sensing
 Acoustic Testing
 Actuators
 Actuators
 Actuators
 Actuators
 Actuators
 Ada Software
 Ada Software
 Ada Software
 Adhesives
 Adhesives
 Advanced Industrial
 Materials
 Aerial and Surface
 Target Systems
 Aerial Delivery Systems
 Aerial Spray/Fire Bombing
 Aerial Survey
 Aerial Target
 Tracking System
 Aerial Targets

 Aerial Targets
 Aerodynamic Test Facilities
 Aerodynamics
 Aeromagnetic Gradiometer
 Air Conditioning (Aircraft)
 Air Defense Display
 Air Defense Vehicle
 Air Delivery Systems
 Air Delivery Systems
 Air Gas Separators
 Air Traffic Control
 Airborne Camera Platforms
 Airborne Electromagnetic
 Sensor
 Airborne Laser Fluorosensor
 Airborne Mission
 Management Systems
 Airborne Sensors
 Aircraft
 Aircraft
 Aircraft Accessories
 Aircraft Air Conditioning
 Aircraft Cabin Interiors
 Aircraft Control
 Aircraft Conversions

COMPANY

COMPUTING DEVICES COMPANY
DY-4 SYSTEMS Inc
EXPRO CHEMICAL PRODUCTS Inc
EXPRO CHEMICAL PRODUCTS Inc
EXPRO CHEMICAL PRODUCTS Inc
SHERRITT GORDON Ltd
ADVANCED MATERIALS
ENGINEERING CENTRE
CARR-SAWYER Inc
AASTRA CORPORATION
DSMA INTERNATIONAL Inc
MONAC INTERNATIONAL Corp
COMPUTING DEVICES COMPANY
DEVTEK CORPORATION
SPARTON OF CANADA Ltd
APREL Inc
AERO MACHINING Ltd
DEVTEK CORPORATION
DOWTY CANADA Ltd
NOVATRONICS Inc
RHK AERO SUPPORT Inc
ARRAY SYSTEMS COMPUTING Inc
SOFTWARE KINETICS Ltd
UNISYS CANADA Inc
CIBA-GEIGY CANADA Ltd
TIMMINCO Ltd
SHERRITT GORDON Ltd

BOEING WINNIPEG

CONAIR AVIATION Ltd
FIELD AVIATION COMPANY Inc
FIELD AVIATION COMPANY Inc
SED SYSTEMS Inc

(ATS) AERONAUTICAL
TRNG SYS Inc
TARGETAIR Ltd
DSMA INTERNATIONAL Inc
CANADAIR GROUP
INTERA KENTING
CASEY COPTER ACCESSORIES Ltd
ORACLE TELECOMPUTING Inc
GENERAL MOTORS OF CANADA Ltd
BOEING DE HAVILLAND
IRVIN INDUSTRIES CANADA Ltd
3-L FILTERS Ltd
See ATC
ISTEC Inc
BARRINGER RESEARCH Ltd

BARRINGER RESEARCH Ltd
URSEL SYSTEMS Ltd

ISTEC Inc
BOEING DE HAVILLAND
CANADAIR GROUP
GODFREY AEROSPACE Inc
CASEY COPTER ACCESSORIES Ltd
FLEXIBULB PLASTICS INC
BOEING DE HAVILLAND
PLANE AVIONIC ENTERPRISES Inc

KEYWORD

Aircraft Engine Controls
Aircraft Fatigue Measurement
Aircraft Floats
Aircraft Heating
Aircraft Heating
Aircraft Interiors
Aircraft Maintenance
Aircraft Manufacturing Facilities
Aircraft Painting
Aircraft Parts (Distribution)

Aircraft Performance Analysis
Aircraft Sales
Aircraft Satellite Comm Antenna
Aircraft Systems Certification
Aircraft Systems Installation Design
Aircraft Transparencies
Airframe Components
Airframe Components
Airframe Components
Airframe Components
Airframe Components
Airframe Components
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Airframe Components

Airport Equipment
Airport Flight Info Display Systems
Airport Status Systems
Airport Status Systems
Airspace Management

Alarm Systems
Alarm Systems
Algorithm Development

All Terrain Crash Recovery Vehicles
Alloys
Alphanumeric Display

COMPANY

GENESIS MICROCIRCUIT Inc
MONAC INTERNATIONAL Corp

FULL LOTUS MANUFACTURING Inc
AEROTECH INTERNATIONAL Inc
CASEY COPTER ACCESSORIES Ltd
FELL-FAB PRODUCTS
FIELD AVIATION COMPANY Inc
THE AUSTIN COMPANY Ltd

VADEKO INTERNATIONAL Inc
AIRCRAFT APPLIANCES AND
EQUIP Ltd
AVIATION PLANNING SERVICES Ltd

FIELD AVIATION COMPANY Inc
CANADIAN MARCONI COMPANY

PLANE AVIONIC ENTERPRISES Inc
PLANE AVIONIC ENTERPRISES Inc

PLASTAL Inc
AERO MACHINING Ltd
AMHERST AEROSPACE INC
BOEING DE HAVILLAND
BOEING WINNIPEG
BRISTOL AEROSPACE Ltd
CANADAIR GROUP
COORDINATE TOOL Ltd
DEVTEK CORPORATION
FIELD AVIATION COMPANY Inc
FLEET INDUSTRIES
HAWKER SIDDELEY CANADA Inc
IMP GROUP Ltd
KAYCOM Inc
LEAVENS AVIATION Inc
McDONNELL DOUGLAS
CANADA Ltd
MENASCO AEROSPACE Ltd
METRO MACHINING CORPORATION
NORTHWEST INDUSTRIES Ltd
PATLON AIRCRAFT &
INDUSTRIES Ltd
SPAR AEROSPACE Ltd
SPECIALIZED WELDING &
FABRICATION Ltd
MICRONAV Ltd
CompEngServ Ltd

CVDS Inc
ORACLE TELECOMPUTING Inc
HOWLAND RUSSELL
CONSULTANTS Ltd
BARON COMMUNICATIONS Ltd
SEA Ltd
WHITESHELL NUCLEAR RESEARCH
ESTAB
LAVALIN Inc/LAVALIN DEFENCE Inc

SHERRITT GORDON Ltd
MATROX ELECTRONIC
SYSTEMS Ltd

KEYWORD**COMPANY**

Avionics
Avionics
Avionics
Avionics
Avionics
Avionics
Avionics
Avionics Components
Avionics Computers
Avionics Design Engineering
Avionics Testing
Avionics Training
Axial Cable
Ballistic Computer Systems
Bar Code (Scanners/Labels)
Based Tone Signalling
Bathythermographs
Battery Analyzers
Battery Chargers
Battery Chargers
Battery Management Systems
Beacon Antennas
Beacons
Beacons
Beacons
Bearings (Instrument)
Bearings (Roller)
Beta Barium Borate Crystals
Beta Ray Monitors
Bias Insertion Units
Biological Environment
Biological Research
Biological Research
Biomass
BK 117 Helicopter
Blankets
Blowers (Zero Leakage)
BO 105 Helicopter
Board-Level Video Products
Bolts
Bonded Components
Bonded Components
Bonded Components
Bonded Enclosures
Bonded Honeycomb Components
Boots PVC
Boring
Boring
Brake Parts
Brazed Aluminum
Heat Sinks
Brazing
Bridges
Broadcast Antennas
Broadcasting
Brushless DC Motors
BT Sonobuoys
Bubble Memory
Build-To-Print
Build-To-Print
Build-To-Print
Build-To-Print
Build-To-Print
Build-To-Print

FIELD AVIATION COMPANY Inc
GARRETT CANADA
IMP GROUP Ltd
INNOTECH AVIATION ENTERPRISES Ltd
LITTON SYSTEMS CANADA Ltd
PELORUS NAVIGATION SYSTEMS Inc
ROCKWELL INTERNATIONAL OF CANADA Ltd
THE AEROSPACE CONSORTIUM Inc
STRITE INDUSTRIES Ltd
DY-4 SYSTEMS Inc
DOWTY CANADA ELECTRONICS Ltd
PLANE AVIONIC ENTERPRISES Inc
NAVAIR Ltd
LEBLANC & ROYLE TELCOM Inc
COMPUTING DEVICES COMPANY
BARSCAN Inc
BARON COMMUNICATIONS Ltd
SPARTON OF CANADA Ltd
CADEX ELECTRONICS Inc
CADEX ELECTRONICS Inc
CTS OF CANADA LTD
CANADIAN ASTRONAUTICS Ltd
LEBLANC & ROYLE TELCOM Inc
GARRETT CANADA
HERMES ELECTRONICS Ltd
SPILSBURY COMMUNICATIONS Ltd
FAG BEARINGS Ltd
PRATT & WHITNEY CANADA Ltd
CRYSTAR RESEARCH Inc
SCINTREX Ltd
AVTECH ELECTROSYSTEMS Ltd
WHITESHELL NUCLEAR RESEARCH ESTAB
NOVA SCOTIA RESEARCH FOUNDATION Corp
ONTARIO HYDRO
ONTARIO HYDRO
MBB HELICOPTER CANADA Ltd
THE H I THOMPSON CO
NOVA SCOTIA RESEARCH FOUNDATION Corp
MBB HELICOPTER CANADA Ltd
MATROX ELECTRONIC S SYSTEMS Ltd
MECAERO CANADA Inc
AMHERST AEROSPACE INC
FLEET INDUSTRIES
McDONNELL DOUGLAS CANADA Ltd
DEVTEK CORPORATION
McDONNELL DOUGLAS CANADA Ltd
THE ACTON RUBBER Ltd
DIEMASTER TOOL Inc
DONLEE PRECISION
BENDIX AVELEX Inc
VAC-AERO INTERNATIONAL Inc
VAC-AERO INTERNATIONAL Inc
MONAC INTERNATIONAL Corp
ANDREW CANADA INC
ROHDE & SCHWARZ CANADA Inc
NOVATRONICS Inc
SPARTON OF CANADA Ltd
TARGA ELECTRONICS SYSTEMS Inc
ANDREW CANADA INC
CALIAN COMMUNICATIONS SYSTEMS Ltd
DOWTY CANADA ELECTRONICS Ltd
GARRETT CANADA
LITTON SYSTEMS CANADA Ltd

KEYWORD**COMPANY**

Build-To-Print
Build-To-Print
Build-To-Print
Build-To-Print
Build-To-Print
Building (Portable)
Business Planning
Business Planning
C-4
C3 Systems
C3 Systems
C3 Systems
C3 Systems
C3 Systems
Cabinets
Cable and Aircraft Handling Systems
Cable Splice Closure
Cable Television
Cables
Cables
Cables
Cables
Cables
CAD
CAD
CAD
CAD/CAM
CAD/CAM
CAD/CAM
CAD/CAM
CAD/CAM
CAD/CAM Services
CAE
Calibration
Calibration
Calibration
Calibration (Mechanical & Electrical)
Calibration Equipment
CAM
CAM
Cameras
Candu (Nuclear Reactors)
Canopies
Carbon Monoxide Gas Detection
Cargo Handling Equipment
Cargo Restraint Systems
Cartography Processing & Database
Cartridges (Filter)
Cases
Cases (Custom)
Casting Alloys
Castings
Castings
Castings
Castings
Catalysis
Catalytic Sensors
Cathode Ray Tube Displays

NEWTECH INSTRUMENTS Ltd
PRICE & KNOTT MANUFACTURING CO Ltd
THE AEROSPACE CONSORTIUM Inc
TRACKER INDUSTRIES Ltd
VAC-AERO INTERNATIONAL Inc
BRITCO STRUCTURES Ltd
AVIATION PLANNING SERVICES Ltd
BRUCE D VALLILLEE ELECTRONICS Ltd
EXPRO CHEMICAL PRODUCTS Inc
COMPUTING DEVICES COMPANY
DY-4 SYSTEMS Inc
GEOVISION Corp
JADE SIMULATIONS INTERNATIONAL Corp
PRIOR DATA SCIENCES Ltd
DOWTY CANADA ELECTRONICS Ltd
INDAL TECHNOLOGIES Inc
NEWTECH INSTRUMENTS Ltd
APPLIED MICROELECTRONICS
CANAC TELECOM
HALPEN ENGINEERING Inc
HARBOUR INDUSTRIES (Canada) Ltd
IMP GROUP Ltd
ITT CANNON CANADA
APPLIED MICROELECTRONICS
THE AUSTIN COMPANY Ltd
LAVALIN Inc/LAVALIN DEFENCE Inc
ADVANCED MATERIALS ENGINEERING CENTRE
HILTAP FITTINGS Ltd
ICAM TECHNOLOGIES Corp
INVAR MANUFACTURING Ltd
STEVESTED MACHINERY & ENGINEERING Ltd
KOSS MACHINE & TOOL CO
APPLIED MICROELECTRONICS
CANADIAN MARCONI COMPANY
DSMA INTERNATIONAL Inc
ROLLS-ROYCE (CANADA) Ltd
QUANTUM INSPECTION AND TESTING Ltd
THE ARMSTRONG MONITORING CORP
ETM INDUSTRIES INC
STRITE INDUSTRIES Ltd
ISTEC Inc
ATOMIC ENERGY OF CANADA Ltd
PLASTAL Inc
THE ARMSTRONG MONITORING CORP
BOEING DE HAVILLAND
FELL-FAB PRODUCTS
MYRIAS RESEARCH Corp
3-L FILTERS Ltd
HOTELLIER CANADA INDUSTRIES Inc
ZARGES AFC CANADA Ltd
TIMMINCO Ltd
CANADAIR GROUP
CERCAST
DESIGNED PRECISION CASTINGS Inc
EASTERN PRECISION CASTING Inc
HALEY INDUSTRIES Ltd
SHELLCAST FOUNDRIES Inc
SHERRITT GORDON Ltd
VESTSHELL Inc
THE LASER INSTITUTE
THE ARMSTRONG MONITORING CORP
LITTON SYSTEMS CANADA Ltd

KEYWORD**COMPANY**

CCD Evaluations
 CCD Image Sensors
 CCTV
 Centerless Grinding
 Centralized Control Units
 Ceramics
 Ceramics

Ceramics
 Ceramics
 Ceramics
 Ceramics (Structural)
 Certification Testing
 Certification Testing
 Chemical Agent
 Detector Kits
 Chemical Agent
 Liquid Simulator
 Chemical Airburst
 Simulators
 Chemical Analysis
 Chemical Analysis

Chemical Films
 Chemical Groundburst
 Simulators
 Chemical Processing
 Chemical Processing

Chemical Vapor Deposition
 Chemical Warfare Defense
 Equipment
 Chlorine Gas Detection

Circuit Card Assembly
 Circuit Layout
 Circuit Packaging
 Circulators
 Civil Structures
 CL File
 Cladding
 Climatic Test Facilities
 CO₂ Lasers
 CO₂ Lasers
 CO₂ Lasers
 CO₂ Optoacoustic Detector
 Coal Technology

Coalescer
 Coalescing Filters

Coastal Patrol Sensors
 Coating Thickness Testing
 Coatings

Coatings
 Coatings
 Coatings
 Coatings
 Coatings

Coatings

Coatings
 Coatings
 Coaxial Cable
 Coaxial Cable Systems
 Coaxial Ferrite Devices
 Cobalt-Samarium Magnets
 Cockpit Displays
 Cockpit Displays
 Cockpit Displays
 Cockpit Displays
 Cockpit Displays
 Cockpit Displays

MONITEQ Ltd
 DALSA Inc
 DALSA Inc
 J J CHARLTON COMPANY Ltd
 TEAM Inc
 AASTRA CORPORATION
 ADVANCED MATERIALS ENGINEERING CENTRE
 ALCAN INTERNATIONAL Ltd
 ATOMIC ENERGY OF CANADA Ltd
 THE LASER INSTITUTE
 EDO CANADA Ltd
 APREL Inc
 DOWTY CANADA Ltd
 ANACHEMIA CANADA Inc
 ANACHEMIA CANADA Inc
 HANDS FIREWORKS Inc
 ATOMIC ENERGY OF CANADA Ltd
 WHITESHELL NUCLEAR RESEARCH ESTAB
 CAMETOID Ltd
 HANDS FIREWORKS Inc
 RAYLO CHEMICALS
 WHITESHELL NUCLEAR RESEARCH ESTAB
 BRISTOL AEROSPACE Ltd
 ANACHEMIA CANADA Inc
 THE ARMSTRONG MONITORING CORP
 LOCKHEED CANADA Inc
 CAD/CAM GRAPHICS Ltd
 CANADIAN MARCONI COMPANY
 LUCAS AEROSPACE (Microwave Div)
 MONAC INTERNATIONAL Corp
 ICAM TECHNOLOGIES Corp
 THE LASER INSTITUTE
 DSMA INTERNATIONAL Inc
 LUMONICS Inc
 MPB TECHNOLOGIES Inc
 ULTRA LASERTECH Inc
 ULTRA LASERTECH Inc
 NOVA SCOTIA RESEARCH FOUNDATION Corp
 3-L FILTERS Ltd
 AIRCRAFT APPLIANCES AND EQUIP Ltd
 ISTECH Inc
 CAMETOID Ltd
 ADVANCED MATERIALS ENGINEERING CENTRE
 BRISTOL AEROSPACE Ltd
 CAMETOID Ltd
 CANADAIR GROUP
 E&CO AEROSPACE INDUSTRIES Inc
 INGADALE PRECISION PRODUCTS Ltd
 McDONNELL DOUGLAS CANADA Ltd
 SHERRITT GORDON Ltd
 VAC-AERO INTERNATIONAL Inc
 HARBOUR INDUSTRIES (Canada) Ltd
 CANAC TELECOM
 LUCAS AEROSPACE (Microwave Div)
 SHERRITT GORDON Ltd
 BOEING DE HAVILLAND
 CANADIAN MARCONI COMPANY
 COMPUTING DEVICES COMPANY
 GARRETT CANADA
 LITTON SYSTEMS CANADA Ltd
 OPTOTEK Ltd

KEYWORD**COMPANY**

Cockpit Indicators
 (Electromechanical)
 Code Generation
 Coherent Countermeasures
 Systems
 Coils
 Collapsible Storage
 Containers
 Collapsible Storage
 Containers
 Colloid Chemistry

Combustible Gas Monitors

Combustion Research

Combustion Research
 Combustion Research
 Combustion Research
 Combustion Research

Comm Consoles
 (Telephone/Radio)
 Command & Control Vehicle
 Command and Control
 Centers

Command Control
 & Communication
 Communication Cable
 Communication Control
 Center Software
 Communication Shelters

Communication Test
 Equipment
 Communications (ASIC)
 Communications (Digital)
 SYSTEMS Ltd
 Communications (Digital)
 Communications
 (Earth Stations)
 Communications
 (EHF Satellite)
 Communications (HF)

Communications (HF)
 Communications (HF)
 Communications (Mobile)
 Communications
 (Monitoring)
 Communications
 (Network Controllers)
 Communications (Products)
 Communications (RF)
 Communications (RF)
 Communications (RF)
 Communications (RF)
 Communications
 (Simulators)
 Communications
 (Telephone)
 Communications
 (Telephone)
 Communications Software

Communications Systems
 Communications Systems
 Communications Systems
 Communications Systems

Communications Systems
 Communications Systems
 Communications Systems
 Communications Systems
 Communications Systems

NOVATRONICS Inc

VIRTUAL PROTOTYPES Inc
 TELEMUS ELECTRONIC
 SYSTEMS Inc
 RHK AERO SUPPORT Inc
 FULL-FAB PRODUCTS

SEI INDUSTRIES Ltd

WHITESHELL NUCLEAR
 RESEARCH ESTAB
 THE ARMSTRONG MONITORING
 CORP

GLOBAL THERMOELECTRIC

POWER SYS Ltd
 ONTARIO HYDRO
 PRATT & WHITNEY CANADA Ltd
 ROLLS-ROYCE (CANADA) Ltd
 WHITESHELL NUCLEAR
 RESEARCH ESTAB
 POSITRON INDUSTRIES Inc

GENERAL MOTORS OF CANADA Ltd
 SED SYSTEMS Inc

See C3

HARBOUR INDUSTRIES (Canada) Ltd
 DATAP SYSTEMS

ROCKWELL INTERNATIONAL OF
 CANADA Ltd
 ROHDE & SCHWARZ CANADA Inc

GENESIS MICROCIRCUIT Inc
 CALIAN COMMUNICATIONS

MICROTEL PACIFIC RESEARCH Ltd
 ANDREW CANADA INC

MICROTEL PACIFIC RESEARCH Ltd

CALIAN COMMUNICATIONS
 SYSTEMS Ltd

DEVTEK CORPORATION
 THE AEROSPACE CONSORTIUM Inc
 CML TECHNOLOGIES Inc
 DATAP SYSTEMS

ULTIMATEAST DATA
 COMMUNICATIONS Ltd
 POSITRON INDUSTRIES Inc
 GE CANADA Inc
 MICROTEL PACIFIC RESEARCH Ltd
 ROHDE & SCHWARZ CANADA Inc
 SKYWAVE ELECTRONICS Ltd
 CALIAN COMMUNICATIONS
 SYSTEMS Ltd
 BARON COMMUNICATIONS Ltd

SKYWAVE ELECTRONICS Ltd

ULTIMATEAST DATA
 COMMUNICATIONS Ltd
 ADGA GROUP
 APPLIED MICROELECTRONICS
 BARON COMMUNICATIONS Ltd
 CALIAN COMMUNICATIONS
 SYSTEMS Ltd
 CANAC TELECOM
 CANADIAN MARCONI COMPANY
 CML TECHNOLOGIES Inc
 COM DEV Ltd
 EDA INSTRUMENTS Inc

KEYWORD

Control Systems
Control Systems
Control Systems
Control Systems
Control Systems
Control Systems (Remote)
Control Towers (Mobile)
Controllers
Controllers
Controllers (Propeller)

Converters (Power)
Core Memory Arrays
Core Wound Products
Correlative/Error
Correcting Coding
Corrosion Control
Corrosion Control
Corrosion Control

Corrosion Control
Corrosion Control
Corrosion Science
Corrosion Science

Cost Allocation
Cost Schedule Control
System
Coupler Systems
Couplings
Crack Growth Rate
Crash Position Indicator
Crew Station Design
Cryptography
Crystals
Crystals
CSA Wire
Current Meter Systems
Cutting
Cutting (Laser)
Cycle Charge
Cylinders
Damping
Damping Measurements

Data Acquisition
Data Acquisition

Data Acquisition
Data Acquisition
Data Acquisition
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Data Acquisition

COMPANY

CAE INDUSTRIES Ltd
GasTOPS Ltd
INDAL TECHNOLOGIES Inc
MENASCO AEROSPACE Ltd
SPAR AEROSPACE Ltd
TRACKER INDUSTRIES Ltd
OERLIKON AEROSPACE Inc
(ATS) AERONAUTICAL TRNG SYS Inc
APPLIED MICROELECTRONICS
EPIC DATA Inc
WESTERN PROPELLER
COMPANY Ltd
CTS OF CANADA LTD
UNISYS CANADA Inc
UNISYS CANADA Inc
GE CANADA Inc

FIELD AVIATION COMPANY Inc
IMP GROUP Ltd
INNOTECH AVIATION
ENTERPRISES Ltd
ROLLS-ROYCE (CANADA) Ltd
THE LASER INSTITUTE
ONTARIO HYDRO
WHITESHELL NUCLEAR
RESEARCH ESTAB
ORACLE TELECOMPUTING Inc
LANDOWNE INTEGRATED
SYSTEMS Inc
THE AEROSPACE CONSORTIUM Inc
HILTAP FITTINGS Ltd
MONAC INTERNATIONAL Corp
GARRETT CANADA
VIRTUAL PROTOTYPES Inc
MYRIAS RESEARCH Corp
CROVEN CRYSTALS Ltd
CRYSTAR RESEARCH Inc
HARBOUR INDUSTRIES (Canada) Ltd
APPLIED MICROSYSTEMS Ltd
THE LASER INSTITUTE
LUMONICS Inc
SEA Ltd
DONLEE PRECISION
DOWTY CANADA Ltd
WHITESHELL NUCLEAR
RESEARCH ESTAB
(ATS) AERONAUTICAL TRNG SYS Inc
AIT ADVANCED INFORMATION
TECHNOLOGIES
APPLIED MICROSYSTEMS Ltd
ARRAY SYSTEMS COMPUTING Inc
BARSCAN Inc
BRISTOL AEROSPACE Ltd
CAE INDUSTRIES Ltd
CALIAN COMMUNICATIONS
SYSTEMS Ltd
CompEngServ Ltd
COMPUTING DEVICES COMPANY
CVDS Inc
DATAP SYSTEMS
EPIC DATA Inc
GasTOPS Ltd
GENESIS MICROCIRCUIT Inc
GEOVISION Corp
INTERA KENTING
INTERACTIVE CIRCUITS &
SYSTEMS Ltd
LITTON SYSTEMS CANADA Ltd
MDS AERO SUPPORT
CORPORATION
MONITEQ Ltd
PRIOR DATA SCIENCES Ltd
QUESTOR SURVEYS Ltd
SEA Ltd
SOFTWARE KINETICS Ltd

KEYWORD

Data Acquisition

Data Acquisition
Data Acquisition

Data Acquisition
Data Analysis
Data Analysis
Data Analysis
Data Analysis
Data Analysis
Data Annotation Displays
Data Command and Control
Data Communications
Data Communications
Data Communications

Data Control Systems
Data Conversion

Data Handling
Data Handling

Data Integration
Data Links Air/Ground
Data Logging
Data Logging
Data Over Voice Interface
Data-Over-Voice Systems
Data Recorders
Data Simulation
Data Switches
Databases
DC Power Supplies
DC Powered Modules
DC Rectifiers
De-icer Platforms
Deceleration Systems
Decommissioning
Deduction
Degaussing Systems
Dehydrators

Demineralizers

Demolition Block
Depth Systems
Derived Release Limits

Design Analysis Reports
Design Engineering
Design Services
Design Services
Detector (Chemical Agents)
Detectors
Detonation

Diagnostic Systems
Die Casting (Aluminum/Zinc)
Die Fabrication
Die Fabrication
Die Fabrication
Die Fabrication
Die Fabrication

Die Fabrication
Dielectric Resonator
Oscillators
Differential Scanning
Calorimetry
Diffusion Coatings (CODEP)
Digital Carrier Modulation
Digital Electronics
Digital Graphics
Digital Image Analysis

COMPANY

SPECTRUM SIGNAL
PROCESSING INC
TEAM Inc
THE ARMSTRONG MONITORING
CORP
TRACKER INDUSTRIES Ltd
BARRINGER RESEARCH Ltd
CANADIAN ASTRONAUTICS Ltd
COMPUTING DEVICES COMPANY
LITTON SYSTEMS CANADA Ltd
QUESTOR SURVEYS Ltd
OPTOTEK Ltd
SOFTWARE KINETICS Ltd
CANADIAN MARCONI COMPANY
OERLIKON AEROSPACE Inc
RE:ACTION MARKETING
SERVICES Ltd
CAE INDUSTRIES Ltd
RE:ACTION MARKETING
SERVICES Ltd
COMPUTING DEVICES COMPANY
MACDONALD DETTWILER AND
ASSOCIATES Ltd
INTERA KENTING
SKYWAVE ELECTRONICS Ltd
APPLIED MICROSYSTEMS Ltd
TARGA ELECTRONICS SYSTEMS Inc
CML TECHNOLOGIES Inc
GANDALF TECHNOLOGIES Inc
TARGA ELECTRONICS SYSTEMS Inc
INTERA KENTING
GANDALF TECHNOLOGIES Inc
DEFT
CTS OF CANADA LTD
AVTECH ELECTROSYSTEMS Ltd
CTS OF CANADA LTD
GODFREY AEROSPACE Inc
IRVIN INDUSTRIES CANADA Ltd
ATOMIC ENERGY OF CANADA Ltd
ODYSSEY RESEARCH ASSOCIATES
CTS OF CANADA LTD
AIRCRAFT APPLIANCES AND
EQUIP Ltd
AIRCRAFT APPLIANCES AND
EQUIP Ltd
EXPRO CHEMICAL PRODUCTS Inc
APPLIED MICROSYSTEMS Ltd
WHITESHELL NUCLEAR
RESEARCH ESTAB
SEMICONDUCTOR INSIGHTS Inc
OERLIKON AEROSPACE Inc
DSMA INTERNATIONAL Inc
THE AUSTIN COMPANY Ltd
ANACHEMIA CANADA Inc
OPTO-ELECTRONICS Inc
WHITESHELL NUCLEAR
RESEARCH ESTAB
SENSYS
AMPTech Corp
AERO MACHINING Ltd
BRISTOL AEROSPACE Ltd
DIEMASTER TOOL Inc
EBCO AEROSPACE INDUSTRIES Inc
INGADAI F PRECISION
PRODUCTS Ltd
NORTHWEST INDUSTRIES Ltd
ITS ELECTRONICS Inc
ADVANCED MATERIALS
ENGINEERING CENTRE
VAC-AERO INTERNATIONAL Inc
GE CANADA Inc
GARRETT CANADA
LAVALIN Inc/LAVALIN DEFENCE Inc
DIPX TECHNOLOGIES Inc

KEYWORD**COMPANY**

Digital Image Analysis
 Digital Order Wire
 Digital Pulse Counter (DIFM)
 Digital Recorders
 Digital Signal Processing
 Digital Signal Processing
 Digital Signal Processing
 Digital Signal Processing
 Digital Signal Processing
 Digital Switches
 Digital Terrain Mapping
 Direct Mail
 Direction Finders
 Direction Finders
 Disk Emulation
 Dispersion Strengthened Alloys
 Displays
 Displays
 Displays
 Displays
 Displays
 Displays
 Disposal (Nuclear Waste)
 Distance Measuring Equipment
 Distance Measuring Equipment
 Distance Measuring Equipment
 Distributed Processing
 Distributed Processing
 Distribution Research
 Diving Life Support Systems
 Documentation
 Documentation
 Documentation
 Documentation
 Documentation
 Domes (Missile)
 Doppler Navigation Systems
 Dosimeters
 Double Base
 Drilling (Laser)
 Drone Alignment Systems
 Drone Recovery Systems
 Drones
 Drug Detection
 Dry Film Lubricants
 Dye Lasers
 Ear-Microphone
 ECCM Antenna
 ECCM Radio
 ECM
 ECM
 ECM
 ECM
 ECM
 ECM Techniques Generator
 Economic Analysis
 Economic Analysis
 Economic Analysis
 Editing
 Effectiveness Evaluation
 EHF Synthesizer

INTERA KENTING
 CANADIAN MARCONI COMPANY
 TELEMUS ELECTRONIC SYSTEMS Inc
 (ATS) AERONAUTICAL TRNG SYS Inc
 INTERACTIVE CIRCUITS & SYSTEMS Ltd
 MICROTREL PACIFIC RESEARCH Ltd
 SKYWAVE ELECTRONICS Ltd
 SPECTRUM SIGNAL PROCESSING INC
 ULTIMATEAST DATA COMMUNICATIONS Ltd
 SED SYSTEMS Inc
 VIRTUAL PROTOTYPES Inc
 RE:ACTION MARKETING SERVICES Ltd
 PELORUS NAVIGATION SYSTEMS Inc
 ROHDE & SCHWARZ CANADA Inc
 KOM Inc
 SHERRITT GORDON Ltd
 CANADIAN MARCONI COMPANY
 LNS SYSTEMS Inc
 MPB TECHNOLOGIES Inc
 OPTOTEK Ltd
 SOFTWARE KINETICS Ltd
 WHITESHELL NUCLEAR RESEARCH ESTAB
 CANADIAN MARCONI COMPANY
 MICRONAV Ltd
 PELORUS NAVIGATION SYSTEMS Inc
 MYRIAS RESEARCH Corp
 UNISYS CANADA Inc
 ONTARIO HYDRO
 NOVA SCOTIA RESEARCH FOUNDATION Corp
 IOTEK Inc
 RE:ACTION MARKETING SERVICES Ltd
 VIRTUAL PROTOTYPES Inc
 W R DAVIS ENGINEERING Ltd
 WILLIAMS ESG Inc
 CRYSTAR RESEARCH Inc
 CANADIAN MARCONI COMPANY
 SCINTREX Ltd
 EXPRO CHEMICAL PRODUCTS Inc
 LUMONICS Inc
 BENDIX AVELEX Inc
 IRVIN INDUSTRIES CANADA Ltd
 See RPV
 SCINTREX Ltd
 CAMETOID Ltd
 LUMONICS Inc
 TELEX MAGNUM
 CANADIAN MARCONI COMPANY
 CANADIAN MARCONI COMPANY
 CANADIAN ASTRONAUTICS Ltd
 ITS ELECTRONICS Inc
 MEL DEFENCE SYSTEMS Ltd
 TELEMUS ELECTRONIC SYSTEMS Inc
 TELEMUS ELECTRONIC SYSTEMS Inc
 AVIATION PLANNING SERVICES Ltd
 SPIECE ASSOCIATES INC
 THOMPSON-HICKLING AVIATION Inc
 RE:ACTION MARKETING SERVICES Ltd
 THOMSON-CSF SYSTEMS CANADA Inc (TCSC)
 RAYTHEON CANADA Ltd

KEYWORD**COMPANY**

Electrical/Electronic Modification
 Electro Mechanical Systems
 Electro-Optics
 Electro-Optics
 Electro-Optics
 Electro-Optics
 Electro-Optics
 Electro-Optics
 Electro-Optics
 Electro-Optics
 Electro-Optics
 Electro-Optics
 Electrochemical Devices
 Electrochemistry
 Electroforming
 Electromagnetic Compatibility
 Electromagnetic Dosimeter
 Electromagnetic Surveys
 Electromagnetics
 Electromagnetics
 Electromechanical Design
 Electromechanical Design
 Electron Beam Welding
 Electronic Computer Aided Design
 Electronic Controls
 Electronic Counter Counter Measures
 Electronic Counter Measures
 Electronic Design
 Electronic Fabrication
 Electronic Gas Detectors
 Electronic Publishing
 Electronic Support Measures
 Electronic Support Measures
 Electronic Support Measures
 Electronic Survey Equipment
 Electronic Systems
 Electronic Systems Design
 Electronic Systems Design
 Electronic Test Equipment
 Electronic Warfare
 Electronics
 Electronics (Nuclear)
 Electronics (Precision Parts)
 Electronics Assembly
 Electronics Research
 Electroplating
 Electroplating
 Electrotechnology Research
 ELINT Products
 ELINT Receivers
 Elliptical Waveguides
 EMC
 EMC
 EMC
 EMC
 Emergency Calling System
 Emergency Locator Beacons
 BOEING ARNPRIOR
 DIEMACO (1984) Inc
 ATLANTIS AEROSPACE Corp
 ATOMIC ENERGY OF CANADA Ltd
 BARRINGER RESEARCH Ltd
 BENDIX AVELEX Inc
 CANADIAN ASTRONAUTICS Ltd
 ERNST LEITZ CANADA Ltd
 GE CANADA Inc
 OERLIKON AEROSPACE Inc
 OPTO-ELECTRONICS Inc
 SPAR AEROSPACE Ltd
 THE ARMSTRONG MONITORING CORP
 WHITESHELL NUCLEAR RESEARCH ESTAB
 LUCAS AEROSPACE (Microwave Div)
 See EMC
 POSITRON INDUSTRIES Inc
 QUFSTOR SURVEYS Ltd
 MPB TECHNOLOGIES Inc
 SCINTREX Ltd
 CANADIAN ASTRONAUTICS Ltd
 DOWTY CANADA Ltd
 VAC-AERO INTERNATIONAL Inc
 JADE SIMULATIONS INTERNATIONAL Corp
 CASEY COPTER ACCESSORIES Ltd
 See ECCM
 See ECM
 INTERACTIVE CIRCUITS & SYSTEMS Ltd
 W R DAVIS ENGINEERING Ltd
 THE ARMSTRONG MONITORING CORP
 RE:ACTION MARKETING SERVICES Ltd
 MEL DEFENCE SYSTEMS Ltd
 ROHDE & SCHWARZ CANADA Inc
 SOFTWARE KINETICS Ltd
 EDO CANADA Ltd
 APPLIED MICROELECTRONICS
 JADE SIMULATIONS INTERNATIONAL Corp
 PARAMAX ELECTRONICS Inc
 OPTOTEK Ltd
 See EW
 GE CANADA Inc
 WHITESHELL NUCLEAR RESEARCH ESTAB
 ETM INDUSTRIES INC
 THE AEROSPACE CONSORTIUM Inc
 ONTARIO HYDRO
 CAMETOID Ltd
 SHERRITT GORDON Ltd
 ONTARIO HYDRO
 TELEMUS ELECTRONIC SYSTEMS Inc
 TELEMUS ELECTRONIC SYSTEMS Inc
 ANDREW CANADA INC
 APREL Inc
 IMP GROUP Ltd
 ROHDE & SCHWARZ CANADA Inc
 WILLIAMS ESG Inc
 CML TECHNOLOGIES Inc
 GARRETT CANADA

KEYWORD

Emergency Locator
Beacons
Emergency Response
Equipment
Emergency Restoration
Service
EMI
EMI
EMI
EMI-NEMP-EMP Shielding

EMI-NEMP-EMP Shielding
EMI/RFI Cabinetry
EMI/RFI Shielding
EMI Shielding
Emission Control
Emitters and Detectors
EMP
EMP Shielding
Enclosures (Electronic)
Energy Conversion
Energy Management
Systems
Engine (Components,
Research, Systems)
Engine Adaptors

Engine Component
Simulator
Engine Components
Engine Components
Engine Components
Engine Components
Engine Components
Engine Components
Engine Components
Engine Components
Engine Components
Engine Components

Engine Components
Engine Components
Engine Control Valve Bodies
Engine Controls
Engine Fuel Control Systems
Engine Health Monitoring
Engine Health Monitoring
Engine Instruments
Engine Monitoring (Inflight)
Engine R&D
Engine Systems
Engine Systems
Engine Systems
Engine Systems
Engine Test
Engine Test Facility

Engine Weldments
Engineering and
Construction
Engineering Consultants
Engineering Sciences
Engineering Services
Engineering Services
Engineering Services
Engineering Services
Engineering Services
Engineering Services
Engineering Support
Engines
Engines
Engines

COMPANY

MICROTEL PACIFIC RESEARCH Ltd
POSITRON INDUSTRIES Inc
LEBLANC & ROYLE TELCOM Inc

APREL Inc
GARRETT CANADA
WILLIAMS ESG Inc
NATIONAL ENG & SCIENCE
ASSOCIATES Inc
THE AUSTIN COMPANY Ltd
DEVTEK CORPORATION
EMCON EMANATION CONTROL Ltd
SHERRITT GORDON Ltd
ONTARIO HYDRO
GE CANADA Inc
EMCON EMANATION CONTROL Ltd
BRITCO STRUCTURES Ltd
SHELLCAST FOUNDRIES Inc
ONTARIO HYDRO
SEA Ltd

PRATT & WHITNEY CANADA Ltd
MDS AERO SUPPORT
CORPORATION
ATLANTIS AEROSPACE Corp

BOEING DE HAVILLAND
BRISTOL AEROSPACE Ltd
DEVTEK CORPORATION
DONLEE PRECISION
ETM INDUSTRIES INC
GE CANADA Inc
HAWKER SIDDELEY CANADA Inc
ROLLS-ROYCE (CANADA) Ltd
SHERRITT GORDON Ltd
SPAR AEROSPACE Ltd
SPECIALIZED WELDING &
FABRICATION Ltd
T R COX AEROFOILS Ltd
TRECO MACHINE & TOOL Ltd
DEVTEK CORPORATION
BOEING DE HAVILLAND
BENDIX AVELEX Inc
GasTOPS Ltd
SENSYS
CANADIAN MARCONI COMPANY
GasTOPS Ltd
HAWKER SIDDELEY CANADA Inc
BOEING DE HAVILLAND
BRISTOL AEROSPACE Ltd
ROLLS-ROYCE (CANADA) Ltd
SHERRITT GORDON Ltd
HAWKER SIDDELEY CANADA Inc
MDS AERO SUPPORT
CORPORATION
DEVTEK CORPORATION
THE AUSTIN COMPANY Ltd

VADEKO INTERNATIONAL Inc
APREL Inc
ROFING ARNPRIOR
DSMA INTERNATIONAL Inc
GasTOPS Ltd
ONTARIO HYDRO
THE AEROSPACE CONSORTIUM Inc
THE AUSTIN COMPANY Ltd
W R DAVIS ENGINEERING Ltd
WARDROP ENGINEERING Inc
WILLIAMS ESG Inc
CANADIAN AIRMOTIVE Inc
GE CANADA Inc
PRATT & WHITNEY CANADA Ltd

KEYWORD

Engines
Engines (Experimental)
Engines (R&D)
Enhanced Blast Technology

Environment
Environment

Environment

Environmental Analysis
Environmental Assessment/
Qualification
Environmental Chemistr,

Environmental Control
Environmental Control
Environmental Control
Environmental Data
Management
Environmental Instruments
Environmental Laboratory
Environmental Laboratory
Environmental Monitoring
Environmental Sensors
Environmental Testing
Environmental Testing
Environmental Testing
Environmental Testing
Equipment Modification
(TEMPEST)

Equipment Selection
Equipment Shelters
Equipment Shelters
ESM
ESM Receiver Test Set

EW Support (Mobile)
EW Systems

EW Systems
EW Systems
EW Systems
EW Systems
EW Systems

EW Systems
EW Systems
EW Systems
EW Systems
EW Systems
EW Systems

Excimer Lasers
Excimer Lasers
Exciters
Expert Systems

Expert Systems
Expert Systems
Expert Systems
Expert Systems
Explosions

Explosives
Explosives
Explosives Detection
Systems
Extended Interaction
Klystrons
Extended Length
Machining
Extended Length
Machining

COMPANY

ROLLS-ROYCE (CANADA) Ltd
SEI INDUSTRIES Ltd
GasTOPS Ltd
THOMSON-CSF SYSTEMS
CANADA Inc (TCSC)
OERLIKON AEROSPACE Inc
THE ARMSTRONG MONITORING
CORP
WHITESHELL NUCLEAR
RESEARCH ESTAB
BARRINGER RESEARCH Ltd
ONTARIO HYDRO

NOVA SCOTIA RESEARCH
FOUNDATION Corp
ATOMIC ENERGY OF CANADA Ltd
BOEING DE HAVILLAND
GARRETT CANADA
CompEngServ Ltd

GARRETT CANADA
DEVTEK CORPORATION
HERMES ELECTRONICS Ltd
MONITEQ Ltd
SPARTON OF CANADA Ltd
APREL Inc
CANADIAN ASTRONAUTICS Ltd
DSMA INTERNATIONAL Inc
WARDROP ENGINEERING Inc
WILLIAMS ESG Inc

AVIATION PLANNING SERVICES Ltd
ANDREW CANADA INC
BRITCO STRUCTURES Ltd
MEL DEFENCE SYSTEMS Ltd
TELEMUS ELECTRONIC
SYSTEMS Inc
GENERAL MOTORS OF CANADA Ltd
CALIAN COMMUNICATIONS
SYSTEMS Ltd
CANADIAN ASTRONAUTICS Ltd
CANADIAN MARCONI COMPANY
COM DEV Ltd
EXCALIBUR SYSTEMS LIMITED
INNOTECH AVIATION
ENTERPRISES Ltd
ITS ELECTRONICS Inc
LOCKHEED CANADA Inc
MEL DEFENCE SYSTEMS Ltd
PRIOR DATA SCIENCES Ltd
ROHDE & SCHWARZ CANADA Inc
SOFTWARE KINETICS Ltd
TELEMUS ELECTRONIC
SYSTEMS Inc

LUMONICS Inc
ULTRA LASERTECH Inc
RHK AERO SUPPORT Inc
AIT ADVANCED INFORMATION
TECHNOLOGIES
CompEngServ Ltd
GasTOPS Ltd
MICROTEL PACIFIC RESEARCH Ltd
VIRTUAL PROTOTYPES Inc
WHITESHELL NUCLEAR
RESEARCH ESTAB
EXPRO CHEMICAL PRODUCTS Inc
HANDS FIREWORKS Inc
BARRINGER RESEARCH Ltd

VARIAN CANADA Inc

BOEING DE HAVILLAND

CANADAIR GROUP

KEYWORD

Extended Length
Machining
Extended Length
Machining
Fabric Structures
Fabricated Aluminum
Structures
Fabrication (Fabrics)
Fabrication/Assembly/Test
Fabrication Procedures

Fabrics (Composite)
Facilities Construction

Facilities Design

Facilities Design
Facilities Management
Failure & Maintainability
Analysis
Failure Analysis
Failure Indicators
Failure Investigations

Fasteners
Fasteners
Fasteners
Fasteners
Fatigue
Fault-Tolerant Systems
Feasibility and Requirement
Studies
Feasibility Studies
Feasibility Studies
Feasibility Studies
Feasibility Studies
Ferrite Devices
Ferrous Castings
Ferrous Metals
Fiber Dispersion
Measurement
Fiber Optic Cable Systems
Fiber Optic
Communications
Fiber Optic
Communications
Fiber Optic
Communications
Fiber Optic Instruments
Fiber Optics
Fiberline Isolator
Field Service
Field Service

Filament Winding

Filament Winding
Filament Winding
Filters
Filters

Financial Information
Display
Finite Element Analysis
Finite Element Methods

Fire Control
Fire Control
Fire Control
Fire Control Optics
Fire Detection & Mapping
Fire Fighting Equipment
Fire Fighting Equipment
(Aircraft)
Fire Proof Wire

COMPANY

EBCO AEROSPACE INDUSTRIES Inc
 McDONNELL DOUGLAS
 CANADA Ltd
 SEI INDUSTRIES Ltd
 ANDREW CANADA INC
 FELL-FAB PRODUCTS
 THE AEROSPACE CONSORTIUM Inc
 QUANTUM INSPECTION AND
 TESTING Ltd
 CIBA-GEIGY CANADA Ltd
 MDS AERO SUPPORT
 CORPORATION
 MDS AERO SUPPORT
 CORPORATION
 THE AUSTIN COMPANY Ltd
 SHL SYSTEMHOUSE Inc
 WARDROP ENGINEERING Inc
 ONTARIO HYDRO
 TEAM Inc
 QUANTUM INSPECTION AND
 TESTING Ltd
 DEVTEK CORPORATION
 ESNA FASTENERS Inc
 INTERFAST Inc
 MECAERO CANADA Inc
 MONAC INTERNATIONAL Corp
 SHL SYSTEMHOUSE Inc
 ARRAY SYSTEMS COMPUTING Inc
 PRIOR DATA SCIENCES Ltd
 THE AUSTIN COMPANY Ltd
 W R CAVIS ENGINEERING Ltd
 WARDROP ENGINEERING Inc
 LUCAS AEROSPACE (Microwave Div)
 EASTERN PRECISION CASTING Inc
 TIMMINCO Ltd
 OPTO-ELECTRONICS Inc
 CANAC TELECOM
 EMCON EMANATION CONTROL Ltd
 MPB TECHNOLOGIES Inc
 WILLIAMS ESG Inc
 OPTO-ELECTRONICS Inc
 APPLIED MICROELECTRONICS
 POSITRON INDUSTRIES Inc
 IOTEK Inc
 MDS AERO SUPPORT
 CORPORATION
 ADVANCED MATERIALS
 ENGINEERING CENTRE
 BOEING WINNIPEG
 EDO CANADA Ltd
 3-L FILTERS Ltd
 AIRCRAFT APPLIANCES AND
 EQUIP Ltd
 MATROX ELECTRONIC
 SYSTEMS Ltd
 W R DAVIS ENGINEERING Ltd
 ADVANCED MATERIALS
 ENGINEERING CENTRE
 ADGA GROUP
 COMPUTING DEVICES COMPANY
 OERLIKON AEROSPACE Inc
 ERNST LEITZ CANADA Ltd
 CONAIR AVIATION Ltd
 SEI INDUSTRIES Ltd
 CONAIR AVIATION Ltd
 HARBOUR INDUSTRIES (Canada) Ltd

KEYWORD

Fire Suppression Systems
 Fixtures (Machining)
 Flares
 Flares
 Flat Panel Displays
 Flat Panel Displays
 Flexible Circuitry
 Flight Control Actuation Systems
 Flight Control Interfaces
 Flight Control Systems
 Flight Controls
 Flight Data Processing
 Flight Data Processing
 Flight Data Processing
 Flight Information
 Flight Information Display Systems
 Flight Information Display Systems
 Flight Management Systems
 Flight Plan Handling
 Flight Service Stations
 Flight Simulation
 Flight Simulators
 Flight System Displays
 Flight Test Equipment
 Flight Testing (Helicopters)
 FLIRs
 Floats (Aircraft)
 Floppy Disk Emulators
 Fluid Couplings
 Fluid Dynamics

 Fluorescent Penetrant Inspection
 Flutter Analysis
 Flux Crystal Growth
 Foil Heat Shields
 Forgings
 Forgings
 Forgings

 Forming
 Forming
 Foundry
 Fracture
 Fracture Analysis
 Fracture Mechanics
 Fracture Mechanics

 Frangible Towers
 Frequency Halver

 Frequency Sources (High Power)
 Frequency Stabilizers
 Fuel Control
 Fuel Control

 Fuel Filters

 Fuel Monitors
 Fuel Research
 Fuel Research
 Fuel Storage
 Fuel Storage & Systems
 Fuel Systems
 Fuel Systems

 Fuel Systems
 Fuses
 Fuses
 GaAs FET Amplifiers
 GaAs MMICs

COMPANY

THE AEROSPACE CONSORTIUM Inc
ETM INDUSTRIES INC
HANDS FIREWORKS Inc
SIGNA-FLASH Ltd
LITTON SYSTEMS CANADA Ltd
OPTOTEK Ltd
ITL CIRCUITS
MENASCO AEROSPACE Ltd

VIRTUAL PROTOTYPES Inc
NOVATRONICS Inc
DEVTEK CORPORATION
LNS SYSTEMS Inc
ORACLE TELECOMPUTING Inc
RAYTHEON CANADA Ltd
SOFTWARE KINETICS Ltd
CVDs Inc

HUGHES AIRCRAFT OF
CANADA Ltd
URSEL SYSTEMS Ltd
ORACLE TELECOMPUTING Inc
URSEL SYSTEMS Ltd
VIRTUAL PROTOTYPES Inc
CAE INDUSTRIES Ltd
URSEL SYSTEMS Ltd
BOEING ARNPRIOR
MBB HELICOPTER CANADA Ltd
SPAR AEROSPACE Ltd
FULL LOTUS MANUFACTURING Inc
TARGA ELECTRONICS SYSTEMS Inc
HILTAP FITTINGS Ltd
WHITESHELL NUCLEAR
RESEARCH ESTAB
SPECIALIZED WELDING &
FABRICATION Ltd
CANADAIR GROUP
CRYSTAR RESEARCH Inc
THE H I THOMPSON CO
CANADA FORGINGS Inc
CANADAIR GROUP
McDONNELL DOUGLAS
CANADA Ltd
HAWKER SIDDELEY CANADA Inc
THE H I THOMPSON CO
SHELLCAST FOUNDRIES Inc
MONAC INTERNATIONAL Corp
CANADAIR GROUP
ONTARIO HYDRO
WHITESHELL NUCLEAR
RESEARCH ESTAB
CARR-SAWYER Inc
TELEUM ELECTRONIC
SYSTEMS Inc
ITS ELECTRONICS Inc

ULTRA LASERTECH Inc
BENDIX AVELEX Inc
MDS AERO SUPPORT
CORPORATION
AIRCRAFT APPLIANCES AND
EQUIP Ltd
3-L FILTERS Ltd
BOEING DE HAVILLAND
PRATT & WHITNEY CANADA Ltd
FELL-FAB PRODUCTS
SEI INDUSTRIES Ltd
BOEING DE HAVILLAND
McDONNELL DOUGLAS
CANADA Ltd
PRATT & WHITNEY CANADA Ltd
3-L FILTERS Ltd
OERLIKON AEROSPACE Inc
LJUCAS AEROSPACE (Microwave Div)
OPTOTEK Ltd

KEYWORD**COMPANY**

Galley Equipment
Gamma Ray Monitors
Gas Detection (Remote)
Gas Detectors

GODFREY AEROSPACE Inc
SCINTREX Ltd
BARRINGER RESEARCH Ltd
THE ARMSTRONG MONITORING
CORP
GasTOPS Ltd
ROLLS-ROYCE (CANADA) Ltd

Gas Path Analysis
Gas Turbine Blade
Inspection

DIEMASTER TOOL Inc
BRISTOL AEROSPACE Ltd
SPAR AEROSPACE Ltd
WINDSOR AEROSPACE
DONLEE PRECISION
WINDSOR AEROSPACE
GLOBAL THERMOELECTRIC
POWER SYS Ltd

Gauges
Gear Boxes
Gear Boxes
Gear Boxes
Gears
Gears
Generators

RHK AERO SUPPORT Inc
SCINTREX Ltd
DIPIX TECHNOLOGIES Inc

Generators
Geochemical Equipment
Geographic Information
Systems

GEOVISION Corp

Geographic Information
Systems

INTERA KENTING

Geographic Information
Systems

ULTIMATEAST DATA
COMMUNICATIONS Ltd
SCINTREX Ltd
APPLIED MICROSYSTEMS Ltd
INTERA KENTING
SPARTON OF CANADA Ltd
ONTARIO HYDRO
ISTEC Inc
ITT CANNON CANADA

Geophysical Equipment
Geophysical Instrumentation
Geophysical Services
Geophysics
Geotechnical Engineering
Gimbals
Glass-to-Metal Hermetic
Connectors

Government Relations

BRUCE D VALLILLEE
ELECTRONICS Ltd
FOOTIT MITCHELL AND
ASSOCIATES
GOVERNMENT CONSULTANTS
INTERNATIONAL
WESTERN PROPELLER
COMPANY Ltd

Government Relations

Government Relations

Governors (Propeller)

Graphics
Graphics
Graphics
Graphics
Graphics Development
Graphics Editor
Graphics Subsystems
Graphite Epoxy Components
Gravity Sensors
Grinding
Grinding

CAE INDUSTRIES Ltd
MATROX ELECTRONIC SYSTEMS Ltd
MPB TECHNOLOGIES Inc
PRIOR DATA SCIENCES Ltd
APPLIED MICROELECTRONICS
VIRTUAL PROTOTYPES Inc
DY-4 SYSTEMS Inc
BOEING WINNIPEG
SCINTREX Ltd
DONLEE PRECISION
INGADALE PRECISION
PRODUCTS Ltd
RAYTHEON CANADA Ltd

Ground Control Approach
Radar

(ATS) AERONAUTICAL TRNG SYS Inc
SEA Ltd
VICTRIX Ltd
CALIAN COMMUNICATIONS
SYSTEMS Ltd

Ground Stations

MACDONALD DETTWILER AND
ASSOCIATES Ltd

Ground Stations
Ground Stations
Ground Steering Systems
Ground Support Equipment
Ground Support Equipment
Ground Support Equipment

SED SYSTEMS Inc
SPAR AEROSPACE Ltd
MENASCO AEROSPACE Ltd
AEROTECH INTERNATIONAL Inc
BOEING ARNPRIOR
MDS AERO SUPPORT
CORPORATION

Ground Support Equipment
Ground Transportation
Guidance System
Components
Gyros

WARDROP ENGINEERING Inc
GENERAL MOTORS OF CANADA Ltd
TRECO MACHINE & TOOL Ltd
STRITE INDUSTRIES Ltd

KEYWORD**COMPANY**

Gyros (Ring Laser)
Gyro stabilization
Handling (Remote)
Handling Systems
Hangars
Hangars
Hardening
Hardness Testing
Hardware Architecture
Harnesses
Harnesses
Harnesses
Hazardous Gas Detection
Hazardous Gas Detection

HC Smoke
Headsets
Health Physics

Heat Energy
Heat Shielding Products
Heat Shields
Heat Tracer Cable
Heat Treating
Heat Treating
Heat Treating
Heat Treating
Heat Treating
Heat Treating
Heat Treating
Heat Treating

Heat Treating
Heat Treating
Heat Treating
Heat Treating
Heat Treating
Heaters (Portable)
Heating
Heating (Aircraft)
Heating (Aircraft)
HELIAX Coaxial Cable
Helicopter External Load
Equipment

Helicopter Hubs
Helicopter Landing Gears
Helicopter Magnetic
Gradiometer
Helicopter Modifications
Helicopter Operations
Helicopter Recovery Assist
Helicopter Retentions
Helicopter Rotors
Helicopter Subsystems
Helicopter Subsystems
Helicopter Subsystems
Helicopter Wire Strike
Protection

Helicopters
Helicopters
Helipad Markers
Hi-Vacuum Metallizing
High Intensity Light Source
High Q Crystals
High Speed Pulsers
High Strength Steels
High Temperature Wire
High Vacuum Couplings
High Voltage
High Voltage Engineering
High Voltage Protection
Products
Higher Order Language

LITTON SYSTEMS CANADA Ltd
ISTEC Inc
WARDROP ENGINEERING Inc
INDAL TECHNOLOGIES Inc
INDAL TECHNOLOGIES Inc
THE AUSTIN COMPANY Ltd
EMCON EMANATION CONTROL Ltd
CAMETOID Ltd
APPLIED MICROELECTRONICS
FELL-FAB PRODUCTS
ITT CANNON CANADA
LOCKHEED CANADA Inc
UNISYS CANADA Inc
SCINTREX Ltd
THE ARMSTRONG MONITORING
CORP
HANDS FIREWORKS Inc
TELEX MAGNUM
WHITESHELL NUCLEAR
RESEARCH ESTAB
ATOMIC ENERGY OF CANADA Ltd
INDAL TECHNOLOGIES Inc
THE H I THOMPSON CO
HARBOUR INDUSTRIES (Canada) Ltd
BOEING ARNPRIOR
BRISTOL AEROSPACE Ltd
CANADAIR GROUP
EBCO AEROSPACE INDUSTRIES Inc
H&S HEAT TREATING
HAWKER SIDDELEY CANADA Inc
LUMONICS Inc
McDONNELL DOUGLAS
CANADA Ltd
ROLLS-ROYCE (CANADA) Ltd
THE LASER INSTITUTE
UDT INDUSTRIES Inc
VAC-AERO INTERNATIONAL Inc
VESTSHELL Inc
VIDE ET TRAITEMENT CANADA Inc
AEROTECH INTERNATIONAL Inc
VORTEK INDUSTRIES Ltd
AEROTECH INTERNATIONAL Inc
CASEY COPTER ACCESSORIES Ltd
ANDREW CANADA INC
SEI INDUSTRIES Ltd

CHICOPEE MANUFACTURING LTD
DOWRY CANADA Ltd
QUESTOR SURVEYS Ltd

CANADIAN HELICOPTERS Ltd
CANADIAN HELICOPTERS Ltd
INDAL TECHNOLOGIES Inc
CHICOPEE MANUFACTURING LTD
DEVTEK CORPORATION
BRISTOL AEROSPACE Ltd
PRATT & WHITNEY CANADA Ltd
SPAR AEROSPACE Ltd
BRISTOL AEROSPACE Ltd

BOEING ARNPRIOR
MBB HELICOPTER CANADA Ltd
SIGNA-FLASH Ltd
FI EXIRI II R PI ASTICS INC
VORTEK INDUSTRIES Ltd
CROVEN CRYSTALS Ltd
AVTECH ELECTROSYSTEMS Ltd
CHICOPEE MANUFACTURING LTD
HARBOUR INDUSTRIES (Canada) Ltd
HILTAP FITTINGS Ltd
VARIAN CANADA Inc
ONTARIO HYDRO
POSITRON INDUSTRIES Inc

ODYSSEY RESEARCH ASSOCIATES

KEYWORD**COMPANY**

Hinges
Hologene Free Wire
Homogenization
Honeycomb Materials
Honing
Horizon Reference Systems
Human Engineering
Human Factors Design
Hush Houses

Hybrid Circuits
Hybrid Circuits
Hybrid Mobile Protected
Weapon System

Hydraulic Actuators
Hydraulic Actuators
Hydraulic Engineering
Hydraulic Hose
Hydraulic Pumps
Hydraulic Servos
Hydraulic Systems
Hydraulic Test Stands
Hydraulics
Hydraulics
Hydraulics
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Hydraulics
Hydraulics

Hydraulics
Hydraulics
Hydraulics

Hydrogen Embrittlement
Hydrogen Sulfide Sensors

Hydrographic Information
System

Hydromechanical
Hydrophones
Ice Detection
Ice Penetration

Illuminated Panels
Illumination Signals

ILS
ILS
ILS
ILS

ILS
ILS
ILS

Image Analysis
Image Intensification
Image Processing
Image Processing
Image Processing
Image Processing
Image Processing
Image Processing

Image Recorder

Imaging

Imaging Arrays
Imaging Systems Airborne
Imaging Technology
Impedance Transformers
Impulse Generators
In-Orbit Real-Time Test
Systems

AERO MACHINING Ltd
HARBOUR INDUSTRIES (Canada) Ltd
VIDE ET TRAITEMENT CANADA Inc
CIBA-GEIGY CANADA Ltd
J J CHARLTON COMPANY Ltd
HONEYWELL Ltd
W R DAVIS ENGINEERING Ltd
VIRTUAL PROTOTYPES Inc
MDS AERO SUPPORT
CORPORATION
CANADIAN MARCONI COMPANY
MICROTEL PACIFIC RESEARCH Ltd
GENERAL MOTORS OF CANADA Ltd

CHICOPEE MANUFACTURING LTD
DEVTEK CORPORATION
OERLIKON AEROSPACE Inc
LEAVENS AVIATION Inc
RHK AERO SUPPORT Inc
AERO MACHINING Ltd
LUCAS AEROSPACE (Control Div)
GODFREY AEROSPACE Inc
BOEING DE HAVILLAND
BRISTOL AEROSPACE Ltd
CAE INDUSTRIES Ltd
DOWTY CANADA Ltd
EBCO AEROSPACE INDUSTRIES Inc
FIELD AVIATION COMPANY Inc
McDONNELL DOUGLAS
CANADA Ltd
MENASCO AEROSPACE Ltd
NORTHWEST INDUSTRIES Ltd
WHITESHELL NUCLEAR
RESEARCH ESTAB
CAMETOID Ltd
THE ARMSTRONG MONITORING
CORP
GEOVISION Corp

DOWTY CANADA Ltd
SPARTON OF CANADA Ltd
PELORUS NAVIGATION SYSTEMS Inc
SPARTON OF CANADA Ltd
HANDS FIREWORKS Inc
CANADIAN MARCONI COMPANY
HANDS FIREWORKS Inc
BOEING ARNPRIOR
HONEYWELL Ltd
KAYCOM Inc
LANDSDOWNE INTEGRATED
SYSTEMS Inc
THE AEROSPACE CONSORTIUM Inc
THE AMTEK GROUP
THOMSON-CSF SYSTEMS
CANADA Inc (TCSC)
MONITEQ Ltd
BENDIX AVELEX Inc
ARRAY SYSTEMS COMPUTING Inc
CANADIAN ASTRONAUTICS Ltd
CANADIAN MARCONI COMPANY
DIPIX TECHNOLOGIES Inc
ERNST LEITZ CANADA Ltd
MACDONALD DETTWILER AND
ASSOCIATES Ltd
MACDONALD DETTWILER AND
ASSOCIATES Ltd
MATROX ELECTRONIC
SYSTEMS Ltd
DALSA Inc
MONITEQ Ltd
SHL SYSTEMHOUSE Inc
AVTECH ELECTROSYSTEMS Ltd
AVTECH ELECTROSYSTEMS Ltd
SED SYSTEMS Inc

KEYWORD**COMPANY**

Independent Verification/
Validation
Indicators
Induction
Induction Hardening
Industrial Benefits
Industrial Benefits
Industrial Benefits
Industrial Control
Instrumentation
Industrial Materials

Industrial Security Eval
& Training
Inertial Navigation
Inertial Navigation
Components
Inflatable Aircraft Floats
Inflatable Floats & Rescue
Equipment
Inflatable Life Support
Systems
Information Handling
Products
Information Systems
Information Systems
Infrared Diode Lasers
Infrared Glass
Infrared Imager
Infrared Instrumentation
Infrared Instrumentation
Infrared Instrumentation
Infrared Optics
Infrared Signature
Suppression
Infrared Systems
Infrared Systems and
Instrumentation
Injection Molding
Injection Molding
Injection Molding
Injection Molding Tools
Inspection

Inspection

Inspection
Inspection Systems
(Remote)

Installations & Servicing
Instrument Landing
Systems

Instrument Landing
Systems
Instrument Landing
Systems

Instrument Landing
Systems
Instrument Landing
Systems

Instrument Landing
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CompEngServ Ltd
NOVATRONICS Inc
ODYSSEY RESEARCH ASSOCIATES
J J CHARLTON COMPANY Ltd
GE CANADA Inc
INTERCON CONSULTANTS
THE AEROSPACE CONSORTIUM Inc
OPTO-ELECTRONICS Inc

ADVANCED MATERIALS
ENGINEERING CENTRE
HOWLAND RUSSELL
CONSULTANTS Ltd
LITTON SYSTEMS CANADA Ltd
STRITE INDUSTRIES Ltd

FULL LOTUS MANUFACTURING Inc
SEI INDUSTRIES Ltd

IRVIN INDUSTRIES CANADA Ltd

UNISYS CANADA Inc

CANAC TELECOM
SHL SYSTEMHOUSE Inc
OPTO-ELECTRONICS Inc
B M HI-TECH Inc
ISTEC Inc
BARRINGER RESEARCH Ltd
OPTO-ELECTRONICS Inc
OPTOTEK Ltd
CRYSTAR RESEARCH Inc
W R DAVIS ENGINEERING Ltd

CANADIAN MARCONI COMPANY
SPAR AEROSPACE Ltd

CANADIAN MARCONI COMPANY
FLEXIBULB PLASTICS INC
IMP GROUP Ltd
KOSS MACHINE & TOOL CO
QUANTUM INSPECTION AND
TESTING Ltd
SPECIALIZED WELDING &
FABRICATION Ltd
THE LASER INSTITUTE
BRISTOL AEROSPACE Ltd

NORTHWEST INDUSTRIES Ltd
ADGA GROUP

BENDIX AVELEX Inc

CANADIAN MARCONI COMPANY

GARRETT CANADA

INDAL TECHNOLOGIES Inc

MARTIN MARIETTA CANADA Ltd

BARRINGER RESEARCH Ltd
CANADIAN MARCONI COMPANY
NORTHWEST INDUSTRIES Ltd
BRISTOL AEROSPACE Ltd
DSMA INTERNATIONAL Inc
MPB TECHNOLOGIES Inc
ONTARIO HYDRO
ZARGES AFC CANADA Ltd
STRITE INDUSTRIES Ltd
SEA Ltd
BENDIX AVELEX Inc
BOEING DE HAVILLAND
COMPUTING DEVICES COMPANY

KEYWORD**COMPANY**

Instruments
Instruments
Instruments (Nuclear)

Insulation Systems
Integrated CAD/CAM Systems
Integrated Circuit (Application Spec)
Integrated Circuit Systems
Integrated Circuits
Integrated High Density LED Displays
Integrated Logistic Support
Integrated Receiver Front Ends
Integrated Surveys
Integrated Systems Management
Integration and Test Facilities
Intelligent Digital Program Switch
Intelligent Instruments
Interactive Analysis

Intercom (Digital Analog)
Interface Control Document
Interface Devices

Interference/Crosspolarized Cancelers
Internal Friction Technology

International Trade Relations

Intrusion Detection
Inventory Control Systems
Inverters
Inverters (DC-AC)
Inverting Transformers
Investment Castings
Investment Castings

Investment Castings
Investment Castings
Investment Castings
Ion Plating
Ion Vapor Deposition
Ionic Nitriding
IR Detectors
IR Detectors & Sources
Irradiations

ISDN Terminal Adapters
Isodapters
Isolators
Isotopes

Isotopic CO2
Ivadizing(tm)
Jig Fabrication (Airframe)
Joint Ventures
Jukebox
Klystrons
Labels (Bar Code)
Laboratory
Laboratory Chemicals
Laminates
Laminates (Solid & Sandwich)
Lamps (High Power)
Landing Aids
Landing Gear
Landing Gear

LITTON SYSTEMS CANADA Ltd
NOVATRONICS Inc
WHITESHELL NUCLEAR RESEARCH ESTAB
THE H I THOMPSON CO
ICAM TECHNOLOGIES Corp

GENESIS MICROCIRCUIT Inc

OERLIKON AEROSPACE Inc
SEMICONDUCTOR INSIGHTS Inc
OPTOTEK Ltd

See ILS
ITS ELECTRONICS Inc

INTERA KENTING
DOWTY CANADA Ltd

WARDROP ENGINEERING Inc

CML TECHNOLOGIES Inc

CANADIAN MARCONI COMPANY
MACDONALD DETTWILER AND ASSOCIATES Ltd
TEAM Inc
THOMPSON-HICKLING AVIATION Inc
ULTIMATEAST DATA COMMUNICATIONS Ltd
ITS ELECTRONICS Inc

WHITESHELL NUCLEAR RESEARCH ESTAB
FOOTIT MITCHELL AND ASSOCIATES
LITTON SYSTEMS CANADA Ltd
CANADIAN MARCONI COMPANY
RHK AERO SUPPORT Inc
CTS OF CANADA LTD
AVTECH ELECTROSYSTEMS Ltd
CERCAST
DESIGNED PRECISION CASTINGS Inc
EASTERN PRECISION CASTING Inc
SHELLCAST FOUNDRIES Inc
VESTSHELL Inc
CAMETOID Ltd
CAMETOID Ltd
VIDE ET TRAITEMENT CANADA Inc
OPTOTEK Ltd
OPTO-ELECTRONICS Inc
WHITESHELL NUCLEAR RESEARCH ESTAB
GANDALF TECHNOLOGIES Inc
LUCAS AEROSPACE (Microwave Div)
LUCAS AEROSPACE (Microwave Div)
WHITESHELL NUCLEAR RESEARCH ESTAB
ULTRA LASERTECH Inc
CAMETOID Ltd
FIELD AVIATION COMPANY Inc
INTERCON CONSULTANTS
KOM Inc
VARIAN CANADA Inc
BARSCAN Inc
HAWKER SIDDELEY CANADA Inc
ANACHEMIA CANADA Inc
CIBA-GEIGY CANADA Ltd
BOEING WINNIPEG

VORTEK INDUSTRIES Ltd
CANADIAN MARCONI COMPANY
BOEING DE HAVILLAND
DOWTY CANADA Ltd

KEYWORD**COMPANY**

Landing Gear
Landing Gear
Landing Gear (Retractable)
Landing Gear Components
Landing Gear Components
Landing Gear Components
Landing Gear Components
Landing Gear Components
Landing Gear Components
Landing Gear Components
Landing Gear Components
Landing Gear Components
Landsat

Landsat Data
LANs (TEMPEST/
Fiber Optic)
Laser Communications
Laser Communications
Laser Controllers
Laser Diode Drivers
Laser Diodes
Laser Film Image Recorder

Laser Instruments
Laser Marking Systems
Laser Materials
Laser Materials Processing
Laser Optics
Laser Printing

Laser Radar
Laser Rods
Laser Simulation
Lasers
Lasers
Lasers
Lasers (CO2, CW, Sealed, Tuneable)
LCD Modules
Leak Detectors

LED Arrays
LED Displays
LED Displays (Multicolor)
LED Materials
LED Technology
Legal Support
Lens (Zoom)
Lenses (Reconnaissance)
Lenses (Underwater)
Level of Repair Analysis
Library (Aircraft Parts)

Life Cycle Costing

Life Cycle Material Management
Life Cycle Support
Life Cycle Support
Life Support Equipment
Lifejacket Lights
Lifejackets
Light Alloy
Light Assembly
Lighted Panels
Lightning Arresters
Lightweight Aircraft Engines
Line Terminating Unit
Linear Pulse Amplifiers
Liquid Cooled Aircraft Engines
Liquid Crystal Displays
Liquid Springs
Lithium Triborate Crystals

MENASCO AEROSPACE Ltd
RHK AERO SUPPORT Inc
FULL LOTUS MANUFACTURING Inc
AERO MACHINING Ltd
CHICOPEE MANUFACTURING LTD
DEVTEK CORPORATION
DONLEE PRECISION
MENASCO AEROSPACE Ltd
METRO MACHINING CORPORATION
STRITE INDUSTRIES Ltd
TRECO MACHINE & TOOL Ltd
WINDSOR AEROSPACE
MACDONALD DETTWILER AND ASSOCIATES Ltd
DIPIX TECHNOLOGIES Inc
EMCON EMANATION CONTROL Ltd

MPB TECHNOLOGIES Inc
TRACKER INDUSTRIES Ltd
ULTRA LASERTECH Inc
AVTECH ELECTROSYSTEMS Ltd
OPTO-ELECTRONICS Inc
MACDONALD DETTWILER AND ASSOCIATES Ltd
MPB TECHNOLOGIES Inc
LUMONICS Inc
B M HI-TECH Inc
LUMONICS Inc
ERNST LEITZ CANADA Ltd
REACTION MARKETING SERVICES Ltd
ERNST LEITZ CANADA Ltd
CRYSTAR RESEARCH Inc
VORTEK INDUSTRIES Ltd
LUMONICS Inc
MPB TECHNOLOGIES Inc
THE LASER INSTITUTE
ULTRA LASERTECH Inc

CML TECHNOLOGIES Inc
THE ARMSTRONG MONITORING CORP
OPTOTEK Ltd
LITTON SYSTEMS CANADA Ltd
OPTOTEK Ltd
OPTOTEK Ltd
W R DAVIS ENGINEERING Ltd
SEMICONDUCTOR INSIGHTS Inc
ISTEC Inc
ERNST LEITZ CANADA Ltd
ERNST LEITZ CANADA Ltd
THE AMTEK GROUP
PATLON AIRCRAFT & INDUSTRIES Ltd
THOMSON-CSF SYSTEMS CANADA Inc (TCSC)
THE AEROSPACE CONSORTIUM Inc

PRIOR DATA SCIENCES Ltd
ROLLS-ROYCE (CANADA) Ltd
TUL SAFETY EQUIPMENT Ltd
SIGNA-FLASH Ltd
TUL SAFETY EQUIPMENT Ltd
HALEY INDUSTRIES Ltd
J J CHARLTON COMPANY Ltd
CANADIAN MARCONI COMPANY
POSITRON INDUSTRIES Inc
CANADIAN AIRMOTIVE Inc
CANADIAN MARCONI COMPANY
AVTECH ELECTROSYSTEMS Ltd
CANADIAN AIRMOTIVE Inc

LITTON SYSTEMS CANADA Ltd
DOWTY CANADA Ltd
CRYSTAR RESEARCH Inc

KEYWORD

COMPANY

Local Area Networking
Locomotives
Logic of Programs
Logistics Engineering
Logistics Engineering

Logistics Support
Logistics Support
Logistics Support Analysis
Logistics Vehicle
Low Frequency Beacon
Systems

Low Hologene Wire
Low Light Level Television
Low Noise Amplifiers
LVTP7 Upgrades
M113 Upgrades
Machine Vision
Machine Vision
Machine Vision
Machined Components

Machined Components

[illegible]

Machining
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Machining

Machining

Macniningo

Machining
Machining
Machining
Machining
Machining
Machining
Machining
Macintosh

Magnesium
Magnesium
Magnesium Fluoride Crystals

UNISYS CANADA Inc
GENERAL MOTORS OF CANADA Ltd
ODYSSEY RESEARCH ASSOCIATES
THOMPSON-HICKLING AVIATION Inc
THOMSON-CSF SYSTEMS
CANADA Inc (TCSC)
BOEING ARNPRIOR
FRONTEC LOGISTICS Corp
THE AMTEK GROUP
GENERAL MOTORS OF CANADA Ltd
SPILSBURY COMMUNICATIONS Ltd

HARBOUR INDUSTRIES (Canada) Ltd
ISTEC Inc
LUCAS AEROSPACE (Microwave Div)
GENERAL MOTORS OF CANADA Ltd
GENERAL MOTORS OF CANADA Ltd
DALSA Inc
MATROX ELECTRONIC SYSTEMS Ltd
THE LASER INSTITUTE
AIRCRAFT APPLIANCES AND
EQUIP Ltd
MECAERO CANADA Inc
AERO MACHINING Ltd
AMHERST AEROSPACE INC
BENDIX AVELEX Inc
BOEING AIRPRICR
BOEING DE HAVILLAND
BRISTOL AEROSPACE Ltd
CANADA FORGINGS Inc
CANADAIR GROUP
CANADIAN MARCONI COMPANY
CAYUGA AUTOMATIC MACHINING
(1985) Ltd

CHICOPEE MANUFACTURING LTD
COORDINATE TOOL Ltd
DEVTEK CORPORATION
DIEMASTER TOOL Inc
DONLEE PRECISION
DOWTY CANADA Ltd
EBCO AEROSPACE INDUSTRIES Inc
ETIM INDUSTRIES INC
EXTEC PRECISION
MANUFACTURING
HAWKER SIDDELEY CANADA Inc
IMP GROUP Ltd
INDAL TECHNOLOGIES Inc
INGADALE PRECISION
PRODUCTS Ltd

INVAR MANUFACTURING Ltd
J J CHARLTON COMPANY Ltd
KOSS MACHINE & TOOL CO
LEAVENS AVIATION Inc
McDONNELL DOUGLAS
CANADA Ltd
METRO MACHINING CORPORATION
MONTREAL PRECISION
CRAFTING Ltd
PRICE & KNOTT MANUFACTURING
CO Ltd

STEVESTED MACHINERY &
ENGINEERING Ltd
STRITE INDUSTRIES Ltd
T H COX AERFOILS Ltd
THE AEROSPACE CONSORTIUM Inc
TRECO MACHINE & TOOL Ltd
UDT INDUSTRIES Inc
VAC-AERO INTERNATIONAL Inc
VICTRIX Ltd
WINDSOR AEROSPACE
DEPT

ROLLS-ROYCE (CANADA) Ltd
TIMMINCO Ltd
CRYSTAR RESEARCH Inc

KEYWORD

COMPANY

Magnesium Sand Castings
Magnetic Anomaly Detection
Magnetic Couplings

Magnetic Devices
Magnetic Gradiometer
Magnetic Particle Inspection

Magnetic Sensors
Magnetic Surveys
Magnetic Tape Transposits
Magnetometers
Magnets (Including
Rare Earth)

- Maintenance
- Maintenance (Predictive)
- Maintenance (Preventive)
- Maintenance & Overhaul
- Facility Plan
- Maintenance Policies
- Maintenance Recovery
- Vehicle

Maintenance Simulators
Man-Machine Interface
Man-Machine Interface
Management Consulting
Management Information
Systems
Management Support
Manipulator Systems
(Remote)
MANTECH

Manuals
Mapping
Mapping
Marine Communications

Marine Signalling Devices
Marine Surveillance System
Markers
Mass Storage
Mass Storage Systems
Materials
Materials
Materials Advanced
Materials Characterization

Materials Development
Materials Piezoelectric
Materials Processing
Materials R&D (Connectors)
Materials Sciences
Materials Testing

Materials Testing &
Development
Mathematical Modelling

Measurement
Measurement & Control
Systems
Measurement & Control
Systems

Mechanical Assembly
Mechanical Assembly
Mechanical Components

Mechanical Components
Mechanical Fabrication
Mechanical Fuel System
Mechanical Testing

HALEY INDUSTRIES Ltd
CAE INDUSTRIES Ltd
NOVA SCOTIA RESEARCH
FOUNDATION Corp
CANADIAN MARCONI COMPANY
QUESTOR SURVEYS Ltd
SPECIALIZED WELDING &
FABRICATION Ltd
SCINTREX Ltd
J'ETERA KENTING
JNISYS CANADA inc
CAE INDUSTRIES Ltd
QUESTOR SURVEYS Ltd
SHERBITT GORDON Ltd

See R&O
SENSYS
DATAP SYSTEMS
THE AUSTIN COMPANY Ltd

UNISYS CANADA Inc
GENERAL MOTORS OF CANADA Ltd

ATLANTIS AEROSPACE Corp
IOTEK Inc
VIRTUAL PROTOTYPES Inc
SPIECE ASSOCIATES INC
DAJAP SYSTEMS

FRONTEC LOGISTICS Corp
SPAR AEROSPACE Ltd

ADVANCED MATERIALS
ENGINEERING CENTRE
HAWKER SIDDELEY CANADA Inc
GEOVISION Corp
QUESTION SURVEYS L'd
ULTIMATEAST DATA
COMMUNICATIONS Ltd
SIGMA-FLASH Ltd
JSTEC Inc
HANDS FIREWORKS Inc
KOM Inc
TARGA ELECTRONICS SYSTEMS Inc
AASTRA CORPORATION
ALCAN INTERNATIONAL Ltd
DOWTY CANADA Ltd
WHITESHELL NUCLEAR
RESEARCH ESTAB
BOEING WINNIPEG
B M HI-TECH Inc
CAMETOID Ltd
JTT CANNON CANADA
ONTARIO HYDRO
ADVANCED MATERIALS
ENGINEERING CENTRE
WHITESHELL NUCLEAR
RESEARCH ESTAB
WHITESHELL NUCLEAR
RESEARCH ESTAB
THE LASER INSTITUTE
GARRETT CANADA

UNISYS CANADA Inc

EBCO AEROSPACE INDUSTRIES Inc
THE AEROSPACE CONSORTIUM Inc
CANYON AUTOMATIC MACHINING
(1985) Ltd
PRICE & KNOTT MANUFACTURING
CO Ltd
W R DAVIS ENGINEERING Ltd
LUCAS AEROSPACE (Control Div)
WHITESHELL NUCLEAR
RESEARCH ESTAB

KEYWORD**COMPANY**

Medical Biophysics
 Medical Equipment (Cases)
 Medium Power Amplifiers
 Memory
 Memory
 Message Switching
 Metal Coatings
 Metal Coatings
 Metal Detection
 Metal Finishing
 Metal Plating
 Metal Powders
 Metallography
 Metallurgy
 Metals
 Metalworking
 Metalworking
 Metalworking
 Metalworking
 Metalworking
 Meteorological Information
 Handling
 Meteorological Instruments
 Meteorological Sat Ground
 Stations
 Meteorological Satellite
 Processing
 Meteorological Stations
 Meteorology
 Metrology
 MMICs
 MIC Design & Production
 Microcircuits
 Microcircuits (Thick &
 Thin Film)
 Microcomputer
 Programming
 Microcomputers
 Microcomputers
 Microelectronics
 Microelectronics
 Microgravity Equipment
 Micronic Filters
 Microprocessor Control
 Units
 Microprocessors
 Microprocessors
 Microprocessors
 Microwave Amplifiers
 Microwave Analysis &
 Design Software
 Microwave Antennas &
 Waveguide
 Microwave Components
 Microwave Hybrids (HMIC)
 Microwave Instruments
 Microwave Landing Systems
 Microwave Prescalers
 Microwave Satellite
 Microwave Subsystems
 Microwave Subsystems
 Microwave Switches
 Microwave Systems
 Microwave Systems
 Microwave Systems
 Military Trucks
 Military Vehicle Engineering
 Millimeter Wave Subsystems

WHITESHELL NUCLEAR
 RESEARCH ESTAB
 ZARGES AFC CANADA Ltd
 LUCAS AEROSPACE (Microwave Div)
 SEMICONDUCTOR INSIGHTS Inc
 TARGA ELECTRONICS SYSTEMS Inc
 ORACLE TELECOMPUTING Inc
 CAMETOID Ltd
 VAC-AERO INTERNATIONAL Inc
 BARRINGER RESEARCH Ltd
 CAMETOID Ltd
 ROLLS-ROYCE (CANADA) Ltd
 SHERRITT GORDON Ltd
 WHITESHELL NUCLEAR
 RESEARCH ESTAB
 WHITESHELL NUCLEAR
 RESEARCH ESTAB
 TIMMINCO Ltd
 BRISTOL AEROSPACE Ltd
 CANADAIR GROUP
 EBCO AEROSPACE INDUSTRIES Inc
 HAWKER SIDDELEY CANADA Inc
 McDONNELL DOUGLAS
 CANADA Ltd
 ORACLE TELECOMPUTING Inc
 APPLIED MICROSYSTEMS Ltd
 ARRAY SYSTEMS COMPUTING Inc
 MACDONALD DETTWILER AND
 ASSOCIATES Ltd
 PELORUS NAVIGATION SYSTEMS Inc
 MYRIAS RESEARCH Corp
 QUANTUM INSPECTION AND
 TESTING Ltd
 MICROTREL PACIFIC RESEARCH Ltd
 TELEMUS ELECTRONIC
 SYSTEMS Inc
 CANADIAN MARCONI COMPANY
 CAD/CAM GRAPHICS Ltd
 REACTION MARKETING
 SERVICES Ltd
 LAVALIN Inc/LAVALIN DEFENCE Inc
 TRACKER INDUSTRIES Ltd
 COM DEV Ltd
 MICROTREL PACIFIC RESEARCH Ltd
 WARDROP ENGINEERING Inc
 3-L FILTERS Ltd
 DOWTY CANADA Ltd
 APPLIED MICROELECTRONICS
 BARON COMMUNICATIONS Ltd
 EPIC DATA Inc
 LUCAS AEROSPACE (Microwave Div)
 OPTOTEK Ltd
 LEBLANC & ROYLE TELCOM Inc
 LUCAS AEROSPACE (Microwave Div)
 ITS ELECTRONICS Inc
 MPB TECHNOLOGIES Inc
 See MLS
 TELEMUS ELECTRONIC
 SYSTEMS Inc
 CANAC TELECOM
 COM DEV Ltd
 MICROTREL PACIFIC RESEARCH Ltd
 COM DEV Ltd
 EARON COMMUNICATIONS Ltd
 EXCALIBUR SYSTEMS LIMITED
 VARIAN CANADA Inc
 LAVALIN Inc/LAVALIN DEFENCE Inc
 W R DAVIS ENGINEERING Ltd
 MICROTREL PACIFIC RESEARCH Ltd

KEYWORD**COMPANY**

Millimeter Wave Subsystems
 Millimeter Wave Systems
 Millimetric Systems
 Milling
 Milling
 Milling
 Mine Clearance
 Mine Clearance
 Mine Clearance
 Miniature Bearings
 Mirror Mounts
 Missile and Munitions
 Technology
 Missile Components
 Missile Components
 Missile Control Systems
 Missile Domes
 Missile Guidance Systems
 Mission Planning
 MLS
 MLS
 MLS
 MLS Structures
 MMICs
 MMICs
 Models and Simulations
 Modems
 Modems
 Modems
 Modems (HF)
 Modification (Aircraft/
 Avionics)
 Modification (Aircraft,
 Helicopters)
 Modification (Aircraft)
 Modification (Aircraft)
 Modification (Aircraft)
 Modification (Design &
 Supply)
 Modification (Helicopters)
 Modification (Helicopters)
 Modular Aeronautical
 Comm Switch
 Modular Design
 Modular Design
 Modular Practice Bomb
 Module Design
 Moldings (Plastic)
 Monitoring & Control
 Monitoring and Control
 Monitors (Gas)
 Monocycle Generators
 Monomers
 Mortar Vehicle
 Motions Compensation
 Motor Speed Control
 Motors
 Multi Layer Coatings
 Multi-Layered Board
 Assemblies
 Multi-Tasking
 Multi-Wave Band Imaging
 Multiplexed Switch
 Multiplexers
 Multiplexers
 Multiplexers
 Mutual Drainage Reactor

VARIAN CANADA Inc
 COM DEV Ltd
 EXCALIBUR SYSTEMS LIMITED
 COORDINATE TOOL Ltd
 DIEMASTER TOOL Inc
 INGDALE PRECISION
 PRODUCTS Ltd
 GENERAL MOTORS OF CANADA Ltd
 THOMSON-CSF SYSTEMS CANADA
 Inc (TCSC)
 WELDCO-BEALS
 FAG BEARINGS Ltd
 ULTRA LASERTECH Inc
 OERLIKON AEROSPACE Inc
 AERO MACHINING Ltd
 WINDSOR AEROSPACE
 GARRETT CANADA
 CRYSTAR RESEARCH Inc
 OERLIKON AEROSPACE Inc
 INTERA KENTING
 CANADIAN MARCONI COMPANY
 MICRONAV Ltd
 PELORUS NAVIGATION SYSTEMS Inc
 INDAL TECHNOLOGIES Inc
 MICROTREL PACIFIC RESEARCH Ltd
 OPTOTEK Ltd
 OERLIKON AEROSPACE Inc
 CALIAN COMMUNICATIONS
 SYSTEMS Ltd
 GANDALF TECHNOLOGIES Inc
 SKYWAVE ELECTRONICS Ltd
 CALIAN COMMUNICATIONS
 SYSTEMS Ltd
 NAVAIR Ltd
 FIELD AVIATION COMPANY Inc
 CONAIR AVIATION Ltd
 IMP GROUP Ltd
 INNTECH AVIATION
 ENTERPRISES Ltd
 GARR-SAWYER Inc
 BOEING ARNPRIOR
 CANADIAN HELICOPTERS Ltd
 HONEYWELL Ltd
 EPIC DATA Inc
 NATIONAL ENG & SCIENCE
 ASSOCIATES Inc
 VICTRIX Ltd
 PRIOR DATA SCIENCES Ltd
 ETM INDUSTRIES INC
 CALIAN COMMUNICATIONS
 SYSTEMS Ltd
 ROHDE & SCHWARZ CANADA Inc
 THE ARMSTRONG MONITORING
 CORP
 AVTECH ELECTROSYSTEMS Ltd
 RAYLO CHEMICALS
 GENERAL MOTORS OF CANADA Ltd
 DOWTY CANADA Ltd
 CASEY COPTER ACCESSORIES Ltd
 RHK AERO SUPPORT Inc
 CAMETOID Ltd
 UNISYS CANADA Inc
 APPLIED MICROELECTRONICS
 ERNST LEITZ CANADA Ltd
 CML TECHNOLOGIES Inc
 CANADIAN MARCONI COMPANY
 GANDALF TECHNOLOGIES Inc
 HONEYWELL Ltd
 POSITRON INDUSTRIES Inc

KEYWORD**COMPANY**

Muzzle Reference Systems
 Nanosecond Devices
 Narcotics Detection Systems
 Natural Resource Development
 Nav/Comin (Systems Engineering)
 Naval Cabinetry (EMI/RFI)
 Naval Combat Systems Navigation
 Navigation Aids
 Navigation Aids
 Navigation Aids
 Navigation Subsystems
 Navigation Systems
 Navigation Systems
 Navigation Systems
 Navigation Systems
 Navigation Systems
 Navigation Systems
 Navigation Systems
 Navigation Systems
 Navigation Systems
 Navigation Training Systems
 Navstar GPS
 NBC Footwear
 Network Control Systems
 Network Inventory
 Network Management

 Network Management
 Network Management
 Network Management
 Network Processors
 Neural Networks
 Neural Networks
 Neutron Activation

 Neutron Activation Analysis
 Nickel (Coinage, Powders, Strip)
 Night Vision
 Night Vision
 Nitrocellulose
 Nitrogen Handling
 Noise Abatement Products
 Non-Destructive Testing

 Non-Destructive Testing
 Non-Destructive Testing
 Non-Destructive Testing
 Non-Destructive Testing
 Non-Destructive Testing
 Non-Destructive Testing

 Non-Destructive Testing
 Non-Destructive Testing
 Non-Destructive Testing
 Non-Destructive Testing

 Non Destructive Testing
 Non-Destructive Testing

 Non-Destructive Testing

 Non-Directional Beacon
 Non-Directional Beacon
 Non-Ferrous Castings
 Non-Ferrous Metals
 Nonlinear Optic Materials
 Normalization
 NOTAM Handling
 Nozzles
 Nuclear Engineering

ERNST LEITZ CANADA Ltd
 AVTECH ELECTROSYSTEMS Ltd
 BARRINGER RESEARCH Ltd

 INTERA KENTING

 ADGA GROUP

 DEVTEK CORPORATION
 PARAMAX ELECTRONICS Inc
 THOMPSON-HICKLING AVIATION Inc
 AVIATION PLANNING SERVICES Ltd
 CANADIAN MARCONI COMPANY
 SPILSBURY COMMUNICATIONS Ltd
 ITS ELECTRONICS Inc
 BENDIX AVELEX Inc
 BOEING DE HAVILLAND
 CANADIAN ASTRONAUTICS Ltd
 CANADIAN MARCONI COMPANY
 COMPUTING DEVICES COMPANY
 LITTON SYSTEMS CANADA Ltd
 PELORUS NAVIGATION SYSTEMS Inc
 SPILSBURY COMMUNICATIONS Ltd
 URSEL SYSTEMS Ltd
 URSEL SYSTEMS Ltd
 CANADIAN MARCONI COMPANY
 THE ACTON RUBBER Ltd
 EDA INSTRUMENTS Inc
 DATAP SYSTEMS
 AIT ADVANCED INFORMATION TECHNOLOGIES
 DAJAP SYSTEMS
 GANDALF TECHNOLOGIES Inc
 LAVALIN Inc/LAVALIN DEFENCE Inc
 GANDALF TECHNOLOGIES Inc
 ARRAY SYSTEMS COMPUTING Inc
 CompEngServ Ltd
 WHITESHELL NUCLEAR RESEARCH ESTAB
 ONTARIO HYDRO
 SHERRITT GORDON Ltd

 BENDIX AVELEX Inc
 SPAR AEROSPACE Ltd
 EXPRO CHEMICAL PRODUCTS Inc
 GODFREY AEROSPACE Inc
 INDAL TECHNOLOGIES Inc
 ADVANCED MATERIALS ENGINEERING CENTRE
 BRISTOL AEROSPACE Ltd
 CANADA FORGINGS Inc
 DONLEE PRECISION
 FIELD AVIATION COMPANY Inc
 IMP GROUP Ltd
 INNOTECH AVIATION ENTERPRISES Ltd
 MONAC INTERNATIONAL Corp
 NORTHWEST INDUSTRIES Ltd
 ONTARIO HYDRO
 QUANTUM INSPECTION AND TESTING Ltd
 ROLLS-ROYCE (CANADA) Ltd
 WESTERN PROPELLER COMPANY Ltd
 WHITESHELL NUCLEAR RESEARCH ESTAB
 MICRONAV Ltd
 SPILSBURY COMMUNICATIONS Ltd
 EASTERN PRECISION CASTING Inc
 TIMMINCO Ltd
 CRYSTAR RESEARCH Inc
 VIDE ET TRAITEMENT CANADA Inc
 ORACLE TELECOMPUTING Inc
 3-L FILTERS Ltd
 ONTARIO HYDRO

KEYWORD**COMPANY**

Nuclear Engineering

 Nuclear Industry (Machining)
 Nuclear Reactor Components
 Nuclear Reactor Components
 Nuclear Repair Equipment
 Nuclear Research
 Nuclear Simulation
 Nuclear Waste Management
 Nuclear Waste Management

 Nuts (Metal)
 Object Oriented Programming
 Ocean Current Measurement
 Ocean Temperature Measurement
 Oceanographic Instrumentation
 Oceanographic Products
 Office Automation
 Offsets
 Oil Coolers
 Oil Spill Control
 Omega Navigation Systems
 Operability Prototype
 Operation & Maintenance
 Operation Support Systems
 Operational Analysis

 Operational Studies
 Operations (Remote)
 Operations Manuals

 Operations Research and Statistics
 Operator Safety Enclosures
 Operator Simulators
 Optic Housings
 Optical Character Recognition
 Optical Coatings
 Optical Coatings
 Optical Disk
 Optical Inspection
 Optical Instruments
 Optical Materials
 Optical Monitors
 Optical Sighting and Ranging Equipment
 Optical Sources & Detectors
 Optical Storage Archive
 Optical Storage Technology
 Optical Systems
 Optics
 Optoacoustic Trace Gas Analyzer
 Optomechanical Precision Assemblies
 Ordnance
 Ordnance Detectors
 Organic Materials Research
 Oscillators and Oscillator Subsystems
 Out-of-Window Displays
 Overhaul Gear Boxes
 Packaging

 Packaging
 Packet Assemblers and Disassemblers

WHITESHELL NUCLEAR RESEARCH ESTAB
 ETM INDUSTRIES INC

 HAWKER SIDDELEY CANADA Inc

 TRECO MACHINE & TOOL Ltd

 VADEKO INTERNATIONAL Inc
 ATOMIC ENERGY OF CANADA Ltd
 CAE INDUSTRIES Ltd
 ONTARIO HYDRO
 WHITESHELL NUCLEAR RESEARCH ESTAB
 ESNA FASTENERS Inc
 AASTRA CORPORATION

 NEWTECH INSTRUMENTS Ltd

 NEWTECH INSTRUMENTS Ltd

 APPLIED MICROSYSTEMS Ltd

 SPARTON OF CANADA Ltd
 LAVALIN Inc/LAVALIN DEFENCE Inc
 INTERCON CONSULTANTS
 DEVTEK CORPORATION
 CONAIR AVIATION Ltd
 CANADIAN MARCONI COMPANY
 VIRTUAL PROTOTYPES Inc
 See R&O
 DATAP SYSTEMS
 THOMSON-CSF SYSTEMS CANADA Inc (TCSC)
 AVIATION PLANNING SERVICES Ltd
 FRONTEC LOGISTICS Corp
 REACTION MARKETING SERVICES Ltd
 ONTARIO HYDRO

 WELDCO-BEALES
 ATLANTIS AEROSPACE Corp
 DEVTEK CORPORATION
 AIT ADVANCED INFORMATION TECHNOLOGIES
 CAMETOID Ltd
 ERNST LEITZ CANADA Ltd
 KOM Inc
 VADEKO INTERNATIONAL Inc
 MPB TECHNOLOGIES Inc
 CRYSTAR RESEARCH Inc
 VADEKO INTERNATIONAL Inc
 OERLIKON AEROSPACE Inc

 OPTO-ELECTRONICS Inc
 KOM Inc
 SHL SYSTEMHOUSE Inc
 THE LASER INSTITUTE
 ATOMIC ENERGY OF CANADA Ltd
 ULTRA LASERTECH Inc

 ERNST LEITZ CANADA Ltd

 HANDS FIREWORKS Inc
 SCINTREX Ltd
 ONTARIO HYDRO
 ITS ELECTRONICS Inc

 VIRTUAL PROTOTYPES Inc
 BRISTOL AEROSPACE Ltd
 LHOTELLIER CANADA INDUSTRIES Inc
 ZARGES AFC CANADA Ltd
 ULTIMATEAST DATA COMMUNICATIONS Ltd

KEYWORD**COMPANY**

Packet Switching
Multiplexors
Packset (HF)

Painting (Aircraft)
Painting (Aircraft)
Painting (Aircraft)
Painting (Aircraft)

Pallet Forks
Paper (Chemical Agent
Detector)
Parachutes
Parallel Processing
Parts (Aircraft)
Parts (Aircraft)

Payload Design & Test
PC Board Design &
Fabrication
PC Board Design &
Fabrication
PC Board Design &
Fabrication
PC Board Design &
Fabrication
PC Board Design &
Fabrication
PC Board Design &
Fabrication
PC Board Design &
Fabrication
PC Emulators
PC/XT/AT Bus

Performance Evaluation
Performance Measuring
Devices
Peripheral Mass Storage
Peripheral Vision Display
Personal Webbing & Gear
Personnel Carrier
Personnel Entry Control
Systems
Personnel Locating Devices
Personnel Restraint
Equipment
Personnel Survival
Equipment
Personnel Survival/Restraint
Phase Locked Loop
Oscillators
Phased Array
Photoacoustics
Photodetectors
Photography
Photoplatting
Photoplatting
Physical Chemistry
Physical Metallurgy
Piezoelectric
Piezoelectric Materials
Pilot Training (RPV)
PIN Diode Switches
Pipelines
Planar Array
Planning

Plasma Spray Coating
Plastic Extrusion
Plastic Fabrication
Plastic Fabrication
Plastic Injection Molding
Plastic Molding
Plastic Molds

EDA INSTRUMENTS Inc

ROCKWELL INTERNATIONAL OF
CANADA Ltd
BOEING ARNPRIOR
FIELD AVIATION COMPANY Inc
IMP GROUP Ltd
INNOTECH AVIATION
ENTERPRISES Ltd
WELDCO-BEALES
ANACHEMIA CANADA Inc

IRVIN INDUSTRIES CANADA Ltd
MYRIAS RESEARCH Corp
COORDINATE TOOL Ltd
PATLON AIRCRAFT &
INDUSTRIES Ltd
SED SYSTEMS Inc
CAD/CAM GRAPHICS Ltd

CAE INDUSTRIES Ltd

CANADIAN MARCONI COMPANY

DOWTY CANADA ELECTRONICS Ltd

GANDALF TECHNOLOGIES Inc

ITL CIRCUITS

UNISYS CANADA Inc

UNISYS CANADA Inc
SPECTRUM SIGNAL
PROCESSING INC
VIRTUAL PROTOTYPES Inc
BOEING DE HAVILLAND

TARGA ELECTRONICS SYSTEMS Inc
GARRETT CANADA
FELL-FAB PRODUCTS
GENERAL MOTORS OF CANADA Ltd
SEA Ltd

SIGNA-FLASH Ltd
IRVIN INDUSTRIES CANADA Ltd

IRVIN INDUSTRIES CANADA Ltd

BOEING DE HAVILLAND
ITS ELECTRONICS Inc

CANADIAN ASTRONAUTICS Ltd
ULTRA LASERTECH Inc
OPTO-ELECTRONICS Inc
ERNST LEITZ CANADA Ltd
CANADIAN MARCONI COMPANY
ITL CIRCUITS
RAYLO CHEMICALS
ONTARIO HYDRO
AASTRA CORPORATION
B M HI-TECH Inc
TARGETAIR Ltd
LUCAS AEROSPACE (Microwave Div)
MONAC INTERNATIONAL Corp
CANADIAN ASTRONAUTICS Ltd
HOWLAND RUSSELL
CONSULTANTS Ltd
VAC-AERO INTERNATIONAL Inc
FLEXIBULB PLASTICS INC
PLASTAL Inc
VICTRIX Ltd
AMPTECH Corp
PLASTAL Inc
ETM INDUSTRIES INC

KEYWORD**COMPANY**

Plastic Parts
Plastics
Plate & Sheet Metal
Fabrication
Plating
Plenum Cable
Plotting Package
(Postprocessed)
Plug-in Computer Boards

Pollution
Pollution Control
Pollution Detection
Pollution Monitoring
Equipment
Polymer Chemistry
Portable Antenna Masts
(Surface)
Portable Terminals
Postprocessor (Multi-Axis)
Powder Metallurgy
Power Amplifiers
Power Amplifiers
Power Converters
Power Dividers
Power Filtering
Power Generators
Power Klystrons
Power Sources

Power Splitters
Power Supplies
Power Supplies
Power Supplies
Power Supplies
Power Supplies
Power Supplies
Power Supplies (Portable,
Remote)
Power Supplies
(Uninterruptible)
Power Systems
Practice Bomb
Practice Bomb Signal
Cartridges
Pre-Wired Board Assemblies
Precision Approach Radar
Precision Approach System
Precision Assembly
Precision Bearings
Precision Electromechanical
Devices
Precision Measurement

Precision Opening Release
Systems
Precision Parts
Precision Sand Castings
Presentations

Pressure Gauges
Pressure Vessel Filters
Printed Circuit Board
Printer Components/
Assemblies
Printheads (LED)
Printing

Process Control
Process Control
Process Control
Process Control
Process Control
Process Development

FLEXIBULB PLASTICS INC
CIBA-GEIGY CANADA Ltd
INVAR MANUFACTURING Ltd

HAWKER SIDDELEY CANADA Inc
HARBOUR INDUSTRIES (Canada) Ltd
ICAM TECHNOLOGIES Corp

SPECTRUM SIGNAL
PROCESSING INC
QUESTOR SURVEYS Ltd
ONTARIO HYDRO
ULTRA LASERTECH Inc
THE ARMSTRONG MONITORING
CORP
RAYLO CHEMICALS
VICTRIX Ltd

EPIC DATA Inc
ICAM TECHNOLOGIES Corp
SHERRITT GORDON Ltd
ITS ELECTRONICS Inc
VARIAN CANADA Inc
CANADIAN ASTRONAUTICS Ltd
ITS ELECTRONICS Inc
EMCON EMANATION CONTROL Ltd
FRONTEC LOGISTICS Corp
VARIAN CANADA Inc
GLOBAL THERMOELECTRIC
POWER SYS Ltd
AVTECH ELECTROSYSTEMS Ltd
CANADIAN MARCONI COMPANY
GARRETT CANADA
LOCKHEED CANADA Inc
SPARTON OF CANADA Ltd
ULTRA LASERTECH Inc
UNISYS CANADA Inc
VARIAN CANADA Inc
GLOBAL THERMOELECTRIC
POWER SYS Ltd
CTS OF CANADA LTD

ONTARIO HYDRO
VICTRIX Ltd
HANDS FIREWORKS Inc

UNISYS CANADA Inc
RAYTHEON CANADA Ltd
MICRONAV Ltd
ETM INDUSTRIES INC
FAG BEARINGS Ltd
NOVATRONICS Inc

QUANTUM INSPECTION AND
TESTING Ltd
IRVIN INDUSTRIES CANADA Ltd

THE LASER INSTITUTE
HALEY INDUSTRIES Ltd
BRUCE D VALLILLEE
ELECTRONICS Ltd
SEA Ltd
3-L FILTERS Ltd
See PC Board
TRECO MACHINE & TOOL Ltd

OPTOTEK Ltd
RE:ACTION MARKETING
SERVICES Ltd
ATOMIC ENERGY OF CANADA Ltd
DATAP SYSTEMS
LAVALIN Inc/LAVALIN DEFENCE Inc
MATROX ELECTRONIC SYSTEMS Ltd
SEA Ltd
RAYLO CHEMICALS

Process Metallurgy
Procurement

Product Characterization
Product Development

Product Surveillance

Profilometry

Program Verification
Programmable Devices
Programming (CNC/NC)
Projected Map Displays
Propellants
Propellers

Proposal Writing

Proposal Writing

Protective Clothing
Protective Coatings
Protective Equipment
Prototyping
Prototyping (Rapid)
Publication Service
Pulse Amplifiers
Pulse Generators
Pulsed Gas Lasers
Pulsers
Pultrusion

Pump Control Systems
Pyrotechnics
Pyrotechnics
Quality Assurance
Quality Assurance

Quality Assurance
Quality Assurance

Quality Assurance
Instrumentation
Quality Assurance Programs

Quantum Chemical
Modelling
Quartz Crystals
Query Language
Quick Connect Coupling
R&O (Accessories)
R&O (Accessories)
R&O (Accessories)
R&O (Accessories)
R&O (Aircraft, Helicopters)
R&O (Aircraft)
R&O (Aircraft)
R&O (Aircraft)
R&O (Aircraft)
R&O (Aircraft)
R&O (Aircraft)

R&O (Aircraft)
R&C (Aircraft)
R&O (Airport/transportation
Facility)
R&O (Antenna Structures)
R&O (Avionics, Comm,
Electronics)
R&O (Avionics)

R&O (Avionics)
R&O (Avionics)
R&O (Avionics)

ONTARIO HYDRO
 GOVERNMENT CONSULTANTS
 INTERNATIONAL
 RAYLO CHEMICALS
 NOVA SCOTIA RESEARCH
 FOUNDATION Corp
 QUANTUM INSPECTION AND
 TESTING Ltd
 ADVANCED MATERIALS
 ENGINEERING CENTRE
 ODYSSEY CONSULTING ASSOCIATES
 APPLIED MICROELECTRONICS
 ICAM TECHNOLOGIES Corp
 COMPUTING DEVICES COMPANY
 EXPRO CHEMICAL PRODUCTS Inc
 WESTERN PROPELLER
 COMPANY Ltd
 HOWLAND RUSSELL
 CONSULTANTS Ltd
 LANSDOWNE INTEGRATED
 SYSTEMS Inc
 IRVIN INDUSTRIES CANADA Ltd
 CAMETOID Ltd
 IRVIN INDUSTRIES CANADA Ltd
 WARDROP ENGINEERING Inc
 VIRTUAL PROTOTYPES Inc
 BOEING ARNPRIOR
 AVTECH ELECTROSYSTEMS Ltd
 AVTECH ELECTROSYSTEMS Ltd
 LUMONICS Inc
 VARIAN CANADA Inc
 ADVANCED MATERIALS
 ENGINEERING CENTRE
 SEA Ltd
 HANDS FIREWORKS Inc
 VICTRIX Ltd
 LAVALIN Inc/LAVALIN DEFENCE Inc
 QUANTUM INSPECTION AND
 TESTING Ltd
 THE AUSTIN COMPANY Ltd
 WHITESHELL NUCLEAR
 RESEARCH ESTAB
 THE LASER INSTITUTE

 BRUCE D VALLILLEE
 ELECTRONICS Ltd
 MYRIAS RESEARCH Corp

 CROVEN CRYSTALS Ltd
 DEFT
 HILTAP FITTINGS Ltd
 CANADIAN HELICOPTERS Ltd
 GODFREY AEROSPACE Inc
 LEAVENS AVIATION Inc
 LUCAS AEROSPACE (Control Div)
 FIELD AVIATION COMPANY Inc
 BOEING ARNPRIOR
 BOEING DE HAVILLAND
 BRISTOL AEROSPACE Ltd
 CONAIR AVIATION Ltd
 IMP GROUP Ltd
 INNOTECH AVIATION
 ENTERPRISES Ltd
 NORTHWEST INDUSTRIES Ltd
 SPAR AEROSPACE Ltd
 FRONTIER LOGISTICS Corp

 LEBLANC & ROYLE TELCOM Inc
 CANADIAN MARCONI COMPANY

 AIRCRAFT APPLIANCES AND
 EQUIP Ltd
 BENDIX AVELEX Inc
 CAE INDUSTRIES Ltd
 CANADIAN HELICOPTERS Ltd

R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Coatings)
R&O (Communications)
R&O (Components)

R&O (Components)
R&O (Components)
R&O (Components)
R&O (Components)
R&O (Components)
R&O (Components)

R&O (Electronics)
SYSTEMS Ltd
R&O (Electronics)
R&O (Electronics)
R&O (Engine Test Facilities)

R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Environics)

R&O (Facility Plan)
R&O (Generators)
R&O (Ground Power)

R&O (Helicopters)
R&O (Helicopters)
R&O (Helicopters)
R&O (Helicopters)
R&O (Helicopters)

R&O (Helicopters)
R&O (Hydraulics)
R&O (Lifejackets)
R&O (Motors)
R&O (Planning)
R&O (Propellers)
R&O (Propellers)

R&O (Radar)
R&O (Radio/Comm)

R&O (Rafts)
R&O (RPV)
R&O (Small Arms)
R&O (Small Arms)
R&O (Stabilization System)
R&O (Telecommunications)
Radar (Primary Surveillance)
Radar (Search)
Radar Antennas
Radar Augmentation
Devices
Radar Data Processing
Radar Data Processing
Radar Data Processing
Radar Data Processing
Radar Data Processing
Radar Data Processing

GARRETT CANADA
 HONEYWELL Ltd
 LITTON SYSTEMS CANADA Ltd
 LNS SYSTEMS Inc
 LOCKHEED CANADA Inc
 NAVAIR Ltd
 NORTHWEST INDUSTRIES Ltd
 SPAR AEROSPACE Ltd
 THE AEROSPACE CONSORTIUM Inc
 CAMETOID Ltd
 EDA INSTRUMENTS Inc
 AIRCRAFT APPLIANCES AND
 EQUIP Ltd
 AMHERST AEROSPACE INC
 BENDIX AVELEX Inc
 BOEING ARNPRIOR
 CANADIAN HELICOPTERS Ltd
 KAYCOM Inc
 SPECIALIZED WELDING &
 FABRICATION Ltd
 CALIAN COMMUNICATIONS

 GE CANADA Inc
 THE AEROSPACE CONSORTIUM Inc
 MDS AERO SUPPORT
 CORPORATION
 BRISTOL AEROSPACE Ltd
 CANADIAN HELICOPTERS Ltd
 GE CANADA Inc
 HAWKER SIDDELEY CANADA Inc
 LEAVENS AVIATION Inc
 PRATT & WHITNEY CANADA Ltd
 ROLLS-ROYCE (CANADA) Ltd
 STANDARD AERO Ltd
 VAC-AERO INTERNATIONAL Inc
 THE ARMSTRONG MONITORING
 CORP
 AVIATION PLANNING SERVICES Ltd
 RHK AERO SUPPORT Inc
 AIRCRAFT APPLIANCES AND
 EQUIP Ltd
 BOEING ARNPRIOR
 BRISTOL AEROSPACE Ltd
 CANADIAN HELICOPTERS Ltd
 IMP GROUP Ltd
 INNOTECH AVIATION
 ENTERPRISES Ltd
 MBB HELICOPTER CANADA Ltd
 CANADIAN HELICOPTERS Ltd
 TUL SAFETY EQUIPMENT Ltd
 RHK AERO SUPPORT Inc
 WARDROP ENGINEERING Inc
 LEAVENS AVIATION Inc
 WESTERN PROPELLER
 COMPANY Ltd
 HONEYWELL Ltd
 ROCKWELL INTERNATIONAL OF
 CANADA Ltd
 TUL SAFETY EQUIPMENT Ltd
 TARGETAIR Ltd
 DEVTEK CORPORATION
 DIEMACO (1984) Inc
 DIEMACO (1984) Inc
 CANAC TELECOM
 RAYTHEON CANADA Ltd
 LITTON SYSTEMS CANADA Ltd
 FLEET INDUSTRIES
 (ATS) AERONAUTICAL TRNG SYS Inc

 DPIX TECHNOLOGIES Inc
 DY-4 SYSTEMS Inc
 LNS SYSTEMS Inc
 RAYTHEON CANADA Ltd
 SOFTWARE KINETICS Ltd
 URSEL SYSTEMS Ltd

KEYWORD

Process Metallurgy
Procurement

Product Characterization
Product Development

Product Surveillance

Profilometry

Program Verification
Programmable Devices
Programming (CNC/NC)
Projected Map Displays
Propellants
Propellers

Proposal Writing

Proposal Writing

Protective Clothing
Protective Coatings
Protective Equipment
Prototyping
Prototyping (Rapid)
Publication Service
Pulse Amplifiers
Pulse Generators
Pulsed Gas Lasers
Pulsers
Pultrusion

Pump Control Systems
Pyrotechnics
Pyrotechnics
Quality Assurance
Quality Assurance

Quality Assurance
Quality Assurance

Quality Assurance
Instrumentation

Quality Assurance Programs

Quantum Chemical
Modelling

Quartz Crystals
Query Language
Quick Connect Coupling
R&O (Accessories)
R&O (Accessories)
R&O (Accessories)
R&O (Accessories)
R&O (Aircraft, Helicopters)
R&O (Aircraft)
R&O (Aircraft)
R&O (Aircraft)
R&O (Aircraft)
R&O (Aircraft)
R&O (Aircraft)
R&O (Aircraft)

R&O (Aircraft)
R&O (Aircraft)
R&O (Airport/Transportation
Facility)
R&O (Antenna Structures)
R&O (Avionics, Comm,
Electronics)
R&O (Avionics)

R&O (Avionics)
R&O (Avionics)
R&O (Avionics)

COMPANY

ONTARIO HYDRO
GOVERNMENT CONSULTANTS
INTERNATIONAL
RAYLO CHEMICALS
NOVA SCOTIA RESEARCH
FOUNDATION Corp
QUANTUM INSPECTION AND
TESTING Ltd
ADVANCED MATERIALS
ENGINEERING CENTRE
RESEARCH ASSOCIATES
APPLIED MICROELECTRONICS
ICAM TECHNOLOGIES Corp
COMPUTING DEVICES COMPANY
EXPRO CHEMICAL PRODUCTS Inc
WESTERN PROPELLER
COMPANY Ltd
HOWLAND RUSSELL
CONSULTANTS Ltd
LANSDOWNE INTEGRATED
SYSTEMS Inc
IRVIN INDUSTRIES CANADA Ltd
CAMETOID Ltd
IRVIN INDUSTRIES CANADA Ltd
WARDROP ENGINEERING Inc
VIRTUAL PROTOTYPES Inc
BOEING ARNPRIOR
AVTECH ELECTROSYSTEMS Ltd
AVTECH ELECTROSYSTEMS Ltd
LUMONICS Inc
VARIAN CANADA Inc
ADVANCED MATERIALS
ENGINEERING CENTRE
SEA Ltd
HANDS FIREWORKS Inc
VICTRIX Ltd
LAVALIN Inc/LAVALIN DEFENCE Inc
QUANTUM INSPECTION AND
TESTING Ltd
THE AUSTIN COMPANY Ltd
WHITESHELL NUCLEAR
RESEARCH ESTAB
THE LASER INSTITUTE
BRUCE D VALLILLEE
ELECTRONICS Ltd
MYRIAS RESEARCH Corp
CROVEN CRYSTALS Ltd
DEFT
HILTAP FITTINGS Ltd
CANADIAN HELICOPTERS Ltd
GODFREY AEROSPACE Inc
LEAVENS AVIATION Inc
LUCAS AEROSPACE (Control Div)
FIELD AVIATION COMPANY Inc
BOEING ARNPRIOR
BOEING DE HAVILLAND
BRISTOL AEROSPACE Ltd
CONAIR AVIATION Ltd
IMP GROUP Ltd
INNOTECH AVIATION
ENTERPRISES Ltd
NORTHWEST INDUSTRIES Ltd
SPAR AEROSPACE Ltd
FRONTEC LOGISTICS Corp
LEBLANC & ROYLE TELCOM Inc
CANADIAN MARCONI COMPANY
AIRCRAFT APPLIANCES AND
EQUIP Ltd
BENDIX AVELEX Inc
CAE INDUSTRIES Ltd
CANADIAN HELICOPTERS Ltd

KEYWORD

R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Avionics)
R&O (Coatings)
R&O (Communications)
R&O (Components)

R&O (Components)
R&O (Components)
R&O (Components)
R&O (Components)
R&O (Components)
R&O (Components)
R&O (Components)

R&O (Electronics)
SYSTEMS Ltd
R&O (Electronics)
R&O (Electronics)
R&O (Engine Test Facilities)

R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Engines)
R&O (Environics)

R&O (Facility Plan)
R&O (Generators)
R&O (Ground Power)

R&O (Helicopters)
R&O (Helicopters)
R&O (Helicopters)
R&O (Helicopters)
R&O (Helicopters)
R&O (Helicopters)

R&O (Helicopters)
R&O (Hydraulics)
R&O (Lifejackets)
R&O (Motors)
R&O (Planning)
R&O (Propellers)
R&O (Propellers)

R&O (Radar)
R&O (Radio/Comm)

R&O (Rafts)
R&O (RPV)
R&O (Small Arms)
R&O (Small Arms)
R&O (Stabilization System)
R&O (Telecommunications)
Radar (Primary Surveillance)
Radar (Search)
Radar Antennas
Radar Augmentation
Devices
Radar Data Processing
Radar Data Processing
Radar Data Processing
Radar Data Processing
Radar Data Processing
Radar Data Processing

COMPANY

GARRETT CANADA
HONEYWELL Ltd
LITTON SYSTEMS CANADA Ltd
LNS SYSTEMS Inc
LOCKHEED CANADA Inc
NAVAIR Ltd
NORTHWEST INDUSTRIES Ltd
SPAR AEROSPACE Ltd
THE AEROSPACE CONSORTIUM Inc
CAMETOID Ltd
EDA INSTRUMENTS Inc
AIRCRAFT APPLIANCES AND
EQUIP Ltd
AMHERST AEROSPACE INC
BENDIX AVELEX Inc
BOEING ARNPRIOR
CANADIAN HELICOPTERS Ltd
KAYCOM Inc
SPECIALIZED WELDING &
FABRICATION Ltd
CALIAN COMMUNICATIONS

GE CANADA Inc
THE AEROSPACE CONSORTIUM Inc
MDS AERO SUPPORT
CORPORATION
BRISTOL AEROSPACE Ltd
CANADIAN HELICOPTERS Ltd
GE CANADA Inc
HAWKER SIDDELEY CANADA Inc
LEAVENS AVIATION Inc
PRATT & WHITNEY CANADA Ltd
ROLLS-ROYCE (CANADA) Ltd
STANDARD AERO Ltd
VAC-AERO INTERNATIONAL Inc
THE ARMSTRONG MONITORING
CORP
AVIATION PLANNING SERVICES Ltd
RHK AERO SUPPORT Inc
AIRCRAFT APPLIANCES AND
EQUIP Ltd
BOEING ARNPRIOR
BRISTOL AEROSPACE Ltd
CANADIAN HELICOPTERS Ltd
IMP GROUP Ltd
INNTECH AVIATION
ENTERPRISES Ltd
M8B HELICOPTER CANADA Ltd
CANADIAN HELICOPTERS Ltd
TUL SAFETY EQUIPMENT Ltd
RHK AERO SUPPORT Inc
WARDROP ENGINEERING Inc
LEAVENS AVIATION Inc
WESTERN PROPELLER
COMPANY Ltd
HONEYWELL Ltd
ROCKWELL INTERNATIONAL OF
CANADA Ltd
TUL SAFETY EQUIPMENT Ltd
TARGETAIR Ltd
DEVTEK CORPORATION
DIEMACO (1984) Inc
DIEMACO (1984) Inc
CANAC TELECOM
RAYTHEON CANADA Ltd
LITTON SYSTEMS CANADA Ltd
FLEET INDUSTRIES
(ATS) AERONAUTICAL TRNG SYS Inc

DIPIX TECHNOLOGIES Inc
DY-4 SYSTEMS Inc
LNS SYSTEMS Inc
RAYTHEON CANADA Ltd
SOFTWARE KINETICS Ltd
URSEL SYSTEMS Ltd

KEYWORD**COMPANY**

Radar Drives
Radar Navigation Aids
Radar Reflectors
Radar Signature Analysis

Radar Signature Analysis

Radar Simulation
Radar Subsystems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems

Radar Systems Analysis

Radar Weather

Radar Weather Stations

Radiation

Radiation Monitoring
Systems

Radiation Resistant Wire

Radiation Shielding

Radio (Transmitters)

Radio Ancillaries

Radio Communications

Radio Communications

Radio Communications

Radio Communications

Radio Communications

Radio Console (Mobile)

Radio Identifier

Radio Management Panel

Radio Spectrum Monitoring
Systems

Radio Wire Integrator

Radiative Wastes

Radiographic Penetrant
Inspection

Radiometer

Radiometric Surveys

Radios (HF, Fixed & Mobile)

Radios (HF)

Radios (HF)

Radiotelephone Equipment

Radiuses

Rafts

Rail Transport

RAPCON

Raster Graphics Display
Systems

Raster/Image Integration

RDX

Reactors

Real Time Computing

Real Time Control Systems

Real Time Control Systems

WINDSOR AEROSPACE

ANDREW CANADA INC

INDAL TECHNOLOGIES Inc

AIT ADVANCED INFORMATION
TECHNOLOGIES

TEI TMUS ELECTRONIC
SYSTEMS Inc

CAE INDUSTRIES Ltd

ITS ELECTRONICS Inc

ADGA GROUP

BENDIX AVELEX Inc

CAE INDUSTRIES Ltd

CANADIAN ASTRONAUTICS Ltd

CANADIAN MARCONI COMPANY

CO. A DEV Ltd

COMPUTING DEVICES COMPANY

EXCALIBUR SYSTEMS LIMITED

INDAL TECHNOLOGIES Inc

LITTON SYSTEMS CANADA Ltd

MPB TECHNOLOGIES Inc

OERLIKON AEROSPACE Inc

PRIOR DATA SCIENCES Ltd

RAYTHEON CANADA Ltd

AIT ADVANCED INFORMATION
TECHNOLOGIES

ANDREW CANADA INC

ARRAY SYSTEMS COMPUTING Inc

WHITESHELL NUCLEAR

RESEARCH ESTAB

SCINTREX Ltd

HARBOUR INDUSTRIES (Canada) Ltd

WHITESHELL NUCLEAR

RESEARCH ESTAB

VARIAN CANADA Inc

CANADIAN MARCONI COMPANY

ADGA GROUP

CALIAN COMMUNICATIONS

SYSTEMS Ltd

CANADIAN MARCONI COMPANY

GARRETT CANADA

ROCKWELL INTERNATIONAL OF

CANADA Ltd

CKL TECHNOLOGIES Inc

POSITION INDUSTRIES Inc

TEAM Inc

LNS SYSTEMS Inc

CANADIAN MARCONI COMPANY

WHITESHELL NUCLEAR

RESEARCH ESTAB

SPECIALIZED WELDING &

FABRICATION Ltd

COM DEV Ltd

INTERA KENTING

SPIESBURY COMMUNICATIONS Ltd

ROCKWELL INTERNATIONAL OF

CANADA Ltd

SKYWAVE ELECTRONICS Ltd

SPIESBURY COMMUNICATIONS Ltd

INDAL TECHNOLOGIES Inc

TUL SAFETY EQUIPMENT Ltd

WHITESHELL NUCLEAR

RESEARCH ESTAB

LNS SYSTEMS Inc

IOTEK Inc

GEOVISION Corp

EXPRO CHEMICAL PRODUCTS Ltd

WHITESHELL NUCLEAR

RESEARCH ESTAB

SPECTRUM SIGNAL

PROCESSING INC

CAE INDUSTRIES Ltd

CompEngServ Ltd

KEYWORD

Real Time Detection

Real Time Graphics

Real Time Monitor Systems

Real Time Software

Real Time Systems

Real Time Systems

Reasoning

Receivers Adaptive

Reconnaissance Aircraft
Systems

Recovery Systems

Recovery Vehicle

Recycling Equipment

Rec-Block Enclosures

Red Signal

Reference Library

(Aircraft Parts)

Reference Manuals

Reflectometer (Optical Time
Domain)

Reflex Klystrons

Refueling Hose

Refueling Systems

Regulators

Regulators (Hi/Lo Voltage)

Relational Database

Management System

Relational Processors

Relay and Control Boxes

Reliability Analysis

Remote Sensing

Remote Sensing

Remote Sensing

Remote Sensing

Remote Sensing

Remote Sensing

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COMPANY

ARRAY SYSTEMS COMPUTING Inc

CAE INDUSTRIES Ltd

CAE INDUSTRIES Ltd

APPLIED MICROELECTRONICS

EXCALIBUR SYSTEMS LIMITED

SOFTWARE KINETICS Ltd

ODYSSEY RESEARCH ASSOCIATES

CALIAN COMMUNICATIONS

SYSTEMS Ltd

URSEL SYSTEMS Ltd

IRVIN INDUSTRIES CANADA Ltd

GENERAL MOTORS OF CANADA Ltd

VADEKO INTERNATIONAL Inc

NATIONAL ENG & SCIENCE

ASSOCIATES Inc

HANDS FIREWORKS Inc

PATLON AIRCRAFT &

INDUSTRIES Ltd

RE:ACTION MARKETING

SERVICES Ltd

OPTO-ELECTRONICS Inc

VARIAN CANADA Inc

3-L FILTERS Ltd

3-L FILTERS Ltd

RHK AERO SUPPORT Inc

GARRETT CANADA

DEFT

DY-4 SYSTEMS Inc

HALPEN ENGINEERING Inc

WARDROP ENGINEERING Inc

AIT ADVANCED INFORMATION

TECHNOLOGIES

BARRINGER RESEARCH Ltd

CANADIAN ASTRONAUTICS Ltd

ERNST LEITZ CANADA Ltd

LAVALIN Inc/LAVALIN DEFENCE Inc

MACDONALD DETAILER AND

ASSOCIATES Ltd

MONITEQ Ltd

QUESTOR SURVEYS Ltd

SCINTREX Ltd

SPAR AEROSPACE Ltd

ITS ELECTRONICS Inc

See R&V

TARGA ELECTRONICS SYSTEMS Inc

See R&O

EBCO AEROSPACE INDUSTRIES Inc

PRIOR DATA SCIENCES Ltd

MIRIAS RESEARCH Corp

ADVANCED MATERIALS

ENGINEERING CENTRE

NOVATRONICS Inc

INTERA KENTING

ITS ELECTRONICS Inc

SEMICONDUCTOR INSIGHTS Inc

VADEKO INTERNATIONAL Inc

RHK AERO SUPPORT Inc

ODYSSEY RESEARCH ASSOCIATES

GARRETT CANADA

SPIECE ASSOCIATES INC

WHITESHELL NUCLEAR

RESEARCH ESTAB

INDUSTRIAL RUBBER Co

VADEKO INTERNATIONAL Inc

ATOMIC ENERGY OF CANADA Ltd

CARR-SAWYER Inc

MPB TECHNOLOGIES Inc

OERLIKON AEROSPACE Inc

SEA Ltd

KEYWORD**COMPANY**

Robotics
 Rock Sciences
 Rocket Engines
 Rocket Igniters
 Rocket Launchers
 Rocket Propellant
 Route Analysis
 RPV
 RPV
 RPV
 RPV
 RPV Ground Control
 Rubber Custom Mixing
 Rubber Molded Parts
 Rubber Retreading
 Ruby Crystals
 Ruggedized Equipment
 Ruggedized Mass
 Storage Systems
 Runway Lighting Systems
 (Mobile)
 Runway Markers
 RVDTs
 Safety Equipment

 Safety Harnesses
 Sales Representation

 Salinity Measurement
 Salt Spray (Fog) Testing
 Sand Castings
 Sandwich Components
 Sapphire Crystals &
 Materials
 Satellite Aided Search
 and Rescue
 Satellite Carrier Monitoring

 Satellite Communications
 Satellite Communications

 Satellite Communications
 Satellite Communications
 Satellite Communications
 Satellite Communications
 Satellite Communications
 Power Amp
 Satellite Earth Stations
 Satellite Electronics
 Satellite Ground Control
 Equipment
 Satellite Ground Stations
 Satellite Information
 Distribution
 Satellite Insulation
 Satellite Platforms
 Satellite Reconnaissance
 Sensors
 Satellite Structures
 Satellite Subsystems

 Satellite Subsystems
 Satellite Subsystems
 (Mobile)
 Satellite Telemetry Tracking/
 Command
 Satellite Terminals
 Satellite Weather Info
 Distribution
 Satellites (Including
 Subsystems)
 Scanning Electron
 Microscopy
 Scope Probes
 Scrambling

WARDROP ENGINEERING Inc
 ONTARIO HYDRO
 BRISTOL AEROSPACE Ltd
 HANDS FIREWORKS Inc
 BRISTOL AEROSPACE Ltd
 BRISTOL AEROSPACE Ltd
 AVIATION PLANNING SERVICES Ltd
 (ATS) AERONAUTICAL TRNG SYS Inc
 BOEING WINNIPEG
 CANADAIR GROUP
 TARGETAIR Ltd
 COMPUTING DEVICES COMPANY
 THE ACTON RUBBER Ltd
 THE ACTON RUBBER Ltd
 THE ACTON RUBBER Ltd
 CRYSTAR RESEARCH Inc
 WILLIAMS ESG Inc
 TARGA ELECTRONICS SYSTEMS Inc

 LNS SYSTEMS Inc

 SIGNA-FLASH Ltd
 NOVATRONICS Inc
 THE ARMSTRONG MONITORING
 CORP
 TUL SAFETY EQUIPMENT Ltd
 GOVERNMENT CONSULTANTS
 INTERNATIONAL
 NEWTECH INSTRUMENTS Ltd
 CAMEOID Ltd
 HALEY INDUSTRIES Ltd
 BC LING WINNIPEG
 CRYSTAR RESEARCH Inc

 ARRAY SYSTEMS COMPUTING Inc

 CALIAN COMMUNICATIONS
 SYSTEMS Ltd
 ADGA GROUP
 CALIAN COMMUNICATIONS
 SYSTEMS Ltd
 CANADIAN ASTRONAUTICS Ltd
 MICROTREL PACIFIC RESEARCH Ltd
 MPB TECHNOLOGIES Inc
 SED SYSTEMS Inc
 VARIAN CANADA Inc

 RAYTHEON CANADA Ltd
 CANADIAN ASTRONAUTICS Ltd
 SED SYSTEMS Inc

 CANADIAN ASTRONAUTICS Ltd
 ORACLE TELECOMPUTING Inc

 FELL-FAB PRODUCTS
 DEVTEK CORPORATION
 DALSA Inc

 FLEET INDUSTRIES
 AIT ADVANCED INFORMATION
 TECHNOLOGIES
 COM DEV Ltd
 ITS ELECTRONICS Inc

 SED SYSTEMS Inc

 SKYWAVE ELECTRONICS Ltd
 LNS SYSTEMS Inc

 SPAR AEROSPACE Ltd

 ADVANCED MATERIALS
 ENGINEERING CENTRE
 AVTECH ELECTROSYSTEMS Ltd
 GE CANADA Inc

KEYWORD**COMPANY**

Screen Rooms
 Screw Machining
 Screws
 SCSI Host Adaptor
 Search & Rescue
 Search & Rescue Equipment
 Seat Manufacture (Aircraft)
 Secure Communications
 Secure Communications
 Secure Communications
 Devices
 Secure Identity Documents

 Secure Office &
 Communications Systems
 Security Management
 Systems
 Security Systems
 Selective Calling Systems
 Self-Skinning Foam Products
 Semiconductor Processing
 Semiconductors
 Semiconductors
 Sensor Data Processing
 Sensor Integration
 Sensor Systems
 Sensors
 Sensors
 Sensors
 Sensors
 Sensors

 Sensors
 Sensors (Fiberoptic)
 Separation Processes

 Separators
 Separators (Oily Water)

 Servo Control Engineering
 Servo Motors
 Sewing (Fabric)
 Sewing (Insulation)
 Shaft Assemblies
 Shafts
 Shafts
 Shafts (Machined)
 Sheet Metal Detailed Parts
 Sheet Metal Fabrication
 Sheet Metal Fabrication

 Sheet Metal Fabrication
 Sheet Metal Fabrication and
 Design
 Sheet Metal Heat Shields
 Sheet Metal Rolling
 Shell Castings
 Shelters

 Shelters
 Shielded Cabinets
 Shielded Racking Cabinets

 Shielded Rooms
 Shielded Rooms (Portable)

 Shielded Rooms (RF)
 Shielding (RF)
 Shielding (RF)
 Shielding Consulting &
 Research
 Shipboard Support Systems
 Shock Mitigation

BRITCO STRUCTURES Ltd
 J J CHARLTON COMPANY Ltd
 MECAERO CANADA Inc
 KOM Inc
 CANADIAN ASTRONAUTICS Ltd
 CANADIAN ASTRONAUTICS Ltd
 FIELD AVIATION COMPANY Inc
 ADGA GROUP
 CANAC TELECOM
 EMCON EMANATION CONTROL Ltd

 AIT ADVANCED INFORMATION
 TECHNOLOGIES
 LAVALIN Inc/LAVALIN DEFENCE Inc

 EPIC DATA Inc

 THE AUSTIN COMPANY Ltd
 TEAM Inc
 FLEXIBULB PLASTICS INC
 VORTEK INDUSTRIES Ltd
 OPTOTEK Ltd
 SEMICONDUCTOR INSIGHTS Inc
 URSEL SYSTEMS Ltd
 SOFTWARE KINETICS Ltd
 SENSYS
 ISTEK Inc
 NOVATRONICS Inc
 OERLIKON AEROSPACE Inc
 QUESTOR SURVEYS Ltd
 THE ARMSTRONG MONITORING
 CORP
 THE LASER INSTITUTE
 OPTO-ELECTRONICS Inc
 WHITESHELL NUCLEAR
 RESEARCH ESTAB
 3-L FILTERS Ltd
 AIRCRAFT APPLIANCES AND
 EQUIP Ltd
 ISTEK Inc
 NOVATRONICS Inc
 FELL-FAB PRODUCTS
 THE H I THOMPSON CO
 WINDSOR AEROSPACE
 DIEMASTER TOOL Inc
 DONLEE PRECISION
 MECAERO CANADA Inc
 BOEING ARNPRIOR
 FIELD AVIATION COMPANY Inc
 INNOTECH AVIATION
 ENTERPRISES Ltd
 NATIONAL ENG & SCIENCE
 ASSOCIATES Inc
 NORTHWEST INDUSTRIES Ltd
 WILLIAMS ESG Inc

 THE H I THOMPSON CO
 W R DAVIS ENGINEERING Ltd
 SHELLCAST FOUNDRIES Inc
 LHOTELLIER CANADA
 INDUSTRIES Inc
 LNS SYSTEMS Inc
 EMCON EMANATION CONTROL Ltd
 NATIONAL ENG & SCIENCE
 ASSOCIATES Inc
 BRITCO STRUCTURES Ltd
 NATIONAL ENG & SCIENCE
 ASSOCIATES Inc
 THE AUSTIN COMPANY Ltd
 BRITCO STRUCTURES Ltd
 EMCON EMANATION CONTROL Ltd
 APREL Inc

 INDAL TECHNOLOGIES Inc
 DOWTY CANADA Ltd

KEYWORD**COMPANY**

Specialty Alloys
Specifications Development
Specifications Development
Specifications Development

Specifications Development
Specifications Development
Spectral Analysis
Spectrometric Technology
Spectroscopy
Spectroscopy
Spectrum Analysis &
Management
SPOT High Resolution Radar

Spotting Charges
Spread Spectrum
Spread Spectrum Modems

SQL Generation
Stabilization
Stabilized Platforms
Stabilized Platforms
Stamping
Stamping
Stamping
Stamping
Stark Cell
Static Switches
Statistical Analysis
Stators
Status Systems
Steam Quality Stack-
Gas Scrubbing
Steer by Wire Systems
Steering (Ground) Systems
Steering Systems
STOL Aircraft Manufacture
Storage of Digital Imagery
Storage of Digital Imagery
Storage Systems
(Dry & Liquid)
Store & Forward Message
Switching
Strategic Planning

Stress Analysis
Stress Monitoring Systems
Stress Relieving
Stress Relieving
Strobe Light
Strobe Lighting Systems
Structural Analysis
Structural Analysis
Structural Analysis (Aircraft)
Structural Ceramics
Structural Components
Structural Components
Structural Design
Structural Design

Structural Dynamics
Structural Fitting
(Helicopters)
Structural Integrity
Structural Integrity
Structural Modification
Structured Methods
Education/Training

Structures
Structures
Structures

Structures
Studies

SHERITT GORDON Ltd
APREL Inc
ODYSSEY RESEARCH ASSOCIATES
RE:ACTION MARKETING
SERVICES Ltd
SHL SYSTEMHOUSE Inc
THOMPSON-HICKLING AVIATION Inc
MONITEQ Ltd
ATOMIC ENERGY OF CANADA Ltd
BARRINGER RESEARCH Ltd
ULTRA LASERTECH Inc
CALIAN COMMUNICATIONS
SYSTEMS Ltd
MACDONALD DETTWILER AND
ASSOCIATES Ltd
HANDS FIREWORKS Inc
GE CANADA Inc
CALIAN COMMUNICATIONS
SYSTEMS Ltd

DEFT
ISTEC Inc
DEVTEK CORPORATION
DIEMACO (1984) Inc
BRISTOL AEROSPACE Ltd
DIEMASTER TOOL Inc
EBCO AEROSPACE INDUSTRIES Inc
HAWKER SIDDELEY CANADA Inc
ULTRA LASERTECH Inc
CTS OF CANADA LTD
OERLIKON AEROSPACE Inc
RHK AERO SUPPORT Inc
BARON COMMUNICATIONS Ltd
ATOMIC ENERGY OF CANADA Ltd

DOWTY CANADA ELECTRONICS Ltd
DOWTY CANADA Ltd
DOWTY CANADA Ltd
BOEING DE HAVILLAND
DPIX TECHNOLOGIES Inc
MICROTEL PACIFIC RESEARCH Ltd
FELL-FAB PRODUCTS

LNS SYSTEMS Inc

HOWLAND RUSSELL
CONSULTANTS Ltd
CARR-SAWYER Inc
MONAC INTERNATIONAL Corp
CAMETOID Ltd
VIDE ET TRAITEMENT CANADA Inc
SIGNA-FLASH Ltd
LEBLANC & ROYLE TELCOM Inc
CANADIAN ASTRONAUTICS Ltd
IMP GROUP Ltd
FIELD AVIATION COMPANY Inc
EDO CANADA Ltd
CHICOPEE MANUFACTURING LTD
NORTHWEST INDUSTRIES Ltd
CANADIAN ASTRONAUTICS Ltd
INNOTECH AVIATION
ENTERPRISES Ltd
ATOMIC ENERGY OF CANADA Ltd
ETM INDUSTRIES INC

MONAC INTERNATIONAL Corp
ONTARIO HYDRO
NORTHWEST INDUSTRIES Ltd
DEFT

AASTRA CORPORATION
ALCAN INTERNATIONAL Ltd
McDONNELL DOUGLAS
CANADA Ltd
SPAR AEROSPACE Ltd
CARR-SAWYER Inc

KEYWORD**COMPANY**

Studs
Subcontract Manufacturing
Subcontractor Search

Subsystems (RF)
Subsystems (RF)
Supercritical Gas
Technology
Supervisory Control Systems
Surface Acoustic Wave
Subsystems
Surface Chemistry

Surface Finishing
Surface Mount
Surface Mount Technology
Surface Topography
Analysis
Surveillance
Surveillance
Surveillance
Survey Systems
(Installations)
Surveys

Survival Kits
Swiss Type Screw Machining
Switch (Solid State)
Switchable Oscillator Banks
Switches
Switches
Switches (TEMPEST/
Fiber Optic)
Switches (X.25)
Synchros
Synthesis
Synthesizers

Synthesizers

Synthetic Aperture Radar
Synthetic Aperture Radar
Synthetic Aperture Radar

Synthetic Pulsed Radar
Synthetic Voice
Systems Facility
Management
Systems Facility Services

Systems Integration
Taber Abrasion Testing
Tachometer Generators

Tactical Communications
Tactical Consoles
Tactical Network
Communications
Tactical Radio Relay
Tactical Signal Simulator
Tactical Simulation
Tactical Switchboards
Tactical Team Trainers
Tactical Towed Line Array
Tactical Training Systems
Tailings

Tamper Resistant Cabinets
Tank Blades
Tanks (Collapsible)
Tanks (Collapsible)
Tape Punch System

MECAERO CANADA Inc
GARRETT CANADA
HOWLAND RUSSELL
CONSULTANTS Ltd
CANADIAN ASTRONAUTICS Ltd
EXCALIBUR SYSTEMS LIMITED
RAYLO CHEMICALS

SEA Ltd
COM DEV Ltd

WHITESHELL NUCLEAR
RESEARCH ESTAB
CAMETOID Ltd
ITL CIRCUITS
POSITRON INDUSTRIES Inc
WHITESHELL NUCLEAR
RESEARCH ESTAB
CANADIAN MARCONI COMPANY
COMPUTING DEVICES COMPANY
ISTEC Inc
PRIOR DATA SCIENCES Ltd
FIELD AVIATION COMPANY Inc

BRUCE D VALLILLEE
ELECTRONICS Ltd
IRVIN INDUSTRIES CANADA Ltd
J J CHARLTON COMPANY Ltd
CML TECHNOLOGIES Inc
ITS ELECTRONICS Inc
LUCAS AEROSPACE (Microwave Div)
UNISYS CANADA Inc
EMCON EMANATION CONTROL Ltd

EDA INSTRUMENTS Inc
NOVATRONICS Inc
RAYLO CHEMICALS
CALIAN COMMUNICATIONS
SYSTEMS Ltd
TELEMUS ELECTRONIC
SYSTEMS Inc
ARRAY SYSTEMS COMPUTING Inc
CANADIAN ASTRONAUTICS Ltd
MACDONALD DETTWILER AND
ASSOCIATES Ltd
MPB TECHNOLOGIES Inc
TEAM Inc
RE:ACTION MARKETING
SERVICES Ltd
RE:ACTION MARKETING
SERVICES Ltd
GARRETT CANADA
CAMETOID Ltd
AIRCRAFT APPLIANCES AND
EQUIP Ltd
ANDREW CANADA INC
VIRTUAL PROTOTYPES Inc
SOFTWARE KINETICS Ltd

CANADIAN MARCONI COMPANY
CANADIAN ASTRONAUTICS Ltd
VIRTUAL PROTOTYPES Inc
CANADIAN MARCONI COMPANY
CAE INDUSTRIES Ltd
INDIAL TECHNOLOGIES Inc
CAE INDUSTRIES Ltd
WHITESHELL NUCLEAR
RESEARCH ESTAB
EMCON EMANATION CONTROL Ltd
WELDCO-BEALES
FELL-FAB PRODUCTS
SEI INDUSTRIES Ltd
ICAM TECHNOLOGIES Corp

KEYWORD

Target Systems (Infantry & Armored)

Targets
TEA Lasers
Technical Manuals

Technical Publication
Production

Technical Publications
Technical Publications
Production

Technical Services
Technical Support
Technical Writing
Technical Writing
Technical Writing

Technology Assessment
Technology Reviews
Teflon Coatings
Teletype Isolator
Telemetry Systems
Telephone Billings Systems
Telephone Interconnect
Terminals

Teleprotection
Telerobotic Products
Temperature Control
Temperature Sensors
Tempering
TEMPEST
TEMPEST
TEMPEST
TEMPEST (Systems
Engineering)
TEMPEST Enclosures

TEMPEST Enclosures
Tents
Terminal Servers
Terminals

Terminals
Terrestrial Microwave
Antennas
Test Equipment
Test Equipment
Test Equipment (Cases)
Test Equipment
(Digital 1553)
Test Facilities
Test Instrumentation
Test Management
Test Rigs
Testing
Testing

Testing (Certification)
Testing (Environmental)
Testing (General)
Testing (Ground & Flight)

Testing (High Pressure)
Testing (Humidity)

Testing (Materials)
Testing (NACSIM) (RF)
Testing (RF)
Testing (Salt Spray)

Testing/Test Equipment
Testing/Test Equipment

Testing/Test Equipment
Testing/Test Equipment

COMPANY

VICTRIX Ltd

TARGETAIR Ltd
LUMONICS Inc
RE:ACTION MARKETING
SERVICES Ltd
THE AEROSPACE CONSORTIUM Inc

DIEMACO (1984) Inc
NORTHWEST INDUSTRIES Ltd

FRONTEC LOGISTICS Corp
WILLIAMS ESG Inc
NORTHWEST INDUSTRIES Ltd
OERLIKON AEROSPACE Inc
RE:ACTION MARKETING
SERVICES Ltd

W R DAVIS ENGINEERING Ltd
SEMICONDUCTOR INSIGHTS Inc
CAMETOID Ltd
POSITRON INDUSTRIES Inc
SEA Ltd
CANAC TELECOM
BARON COMMUNICATIONS Ltd

POSITRON INDUSTRIES Inc
SPAR AEROSPACE Ltd
CASEY COPTER ACCESSORIES Ltd
APPLIED MICROSYSTEMS Ltd
VIDE ET TRAITEMENT CANADA Inc
GARRETT CANADA
MEL DEFENCE SYSTEMS Ltd
WILLIAMS ESG Inc
EMCON EMANATION CONTROL Ltd

NATIONAL ENG & SCIENCE
ASSOCIATES Inc
THE AUSTIN COMPANY Ltd
FELL-FAB PRODUCTS
GANDALF TECHNOLOGIES Inc
CALIAN COMMUNICATIONS
SYSTEMS Ltd
EPIC DATA Inc
ANDREW CANADA INC

DOWTY CANADA ELECTRONICS Ltd
EXCALIBUR SYSTEMS LIMITED
ZARGES AFC CANADA Ltd
ATLANTIS AEROSPACE Corp

DSMA INTERNATIONAL Inc
GARRETT CANADA
DSMA INTERNATIONAL Inc
CANADIAN ASTRONAUTICS Ltd
ATOMIC ENERGY OF CANADA Ltd
QUANTUM INSPECTION AND
TESTING Ltd

APREL Inc
DSMA INTERNATIONAL Inc
IMP GROUP Ltd
INNOTECH AVIATION
ENTERPRISES Ltd

ITT CANNON CANADA
INGADALE PRECISION
PRODUCTS Ltd

ALCATEL INTERNATIONAL Ltd
EMCON EMANATION CONTROL Ltd
LEBLANC & ROYLE TELCOM Inc
INGADALE PRECISION
PRODUCTS Ltd

ATLANTIS AEROSPACE Corp
CALIAN COMMUNICATIONS
SYSTEMS Ltd

CANADIAN GROUP
CANADIAN ASTRONAUTICS Ltd

KEYWORD

Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Theorem Proving
Thermal Analysis

Thermal Conductivity
Devices
Thermal Imager
Thermal Imaging
Thermal Spraying
Thermal Testing
Thermocouple Wire
Thermodynamics Analysis
Thermoelectric Generators

Thermofluids and Tribology
Research
Thermoforming
Thermogravimetric Analysis

Thermomechanical Analysis

Thick Film Hybrid
Microcircuits
Thick Film Hybrid
Microcircuits
Thin Film Deposition
Thin Film Hybrid
Microcircuits
Thin Film Hybrid
Microcircuits
Thin Wall Castings
Thread Grinding
Thrust Frames

Thruster Motors (Electric)
Titanium
Titanium
Titanium
Titanium
Titanium Alloy Powders
Titanium Components

Titanium Doped Sapphire
Tone Signalling
Tooling
Tooling
Tooling
Tooling
Tooling
Tooling
Tooling

Tooling
Tooling

Tooling
Tooling
Tooling
Touch Screen
Towed Arrays
Towers (Antenna)
Towers, Mobile or Fixed
Toxic Chemicals

Toxic Gas Detectors
Toxic Gas Detectors

TPS Development
Trace Analysis

COMPANY

CANADIAN MARCONI COMPANY
CARR-SAWYER Inc
EPIC DATA Inc
GARRETT CANADA
PRATT & WHITNEY CANADA Ltd
ROHDE & SCHWARZ CANADA Inc
W R DAVIS ENGINEERING Ltd
ODYSSEY RESEARCH ASSOCIATES
WHITESHELL NUCLEAR
RESEARCH ESTAB
THE ARMSTRONG MONITORING
CORP
ISTEC Inc
BENDIX AVELEX Inc
SHERRITT GORDON Ltd
VORTEK INDUSTRIES Ltd
HARBOUR INDUSTRIES (Canada) Ltd
W R DAVIS ENGINEERING Ltd
GLOBAL THERMOELECTRIC
POWER SYS Ltd
ONTARIO HYDRO

FLEXIBULB PLASTICS INC
ADVANCED MATERIALS
ENGINEERING CENTRE
ADVANCED MATERIALS
ENGINEERING CENTRE
CAD/CAM GRAPHICS Ltd

CANADIAN MARCONI COMPANY

VADEKO INTERNATIONAL Inc
CAD/CAM GRAPHICS Ltd

CANADIAN MARCONI COMPANY

SHELLCAST FOUNDRIES Inc
STRITE INDUSTRIES Ltd
MDS AERO SUPPORT
CORPORATION
SEI INDUSTRIES Ltd
AERO MACHINING Ltd
BRISTOL AEROSPACE Ltd
CHICOPEE MANUFACTURING LTD
EBCO AEROSPACE INDUSTRIES Inc
SHERRITT GORDON Ltd
METRO MACHINING
CORPORATION
CRYSTAR RESEARCH Inc
BARON COMMUNICATIONS Ltd
AERO MACHINING Ltd
AMPTCH Corp
BOEING ARNPRIOR
BRISTOL AEROSPACE Ltd
EBCO AEROSPACE INDUSTRIES Inc
INGADALE PRECISION
PRODUCTS Ltd
KOSS MACHINE & TOOL CO
McDONNELL DOUGLAS
CANADA Ltd
NORTHWEST INDUSTRIES Ltd
ROLLS-ROYCE (CANADA) Ltd
T R COX AEROFOILS Ltd
VIRTUAL PROTOTYPES Inc
DEVTEK CORPORATION
ANDREW CANADA INC
LNS SYSTEMS Inc
WHITESHELL NUCLEAR
RESEARCH ESTAB
SCINTREX Ltd
THE ARMSTRONG MONITORING
CORP
LOCKHEED CANADA Inc
WHITESHELL NUCLEAR
RESEARCH ESTAB

KEYWORD

- Trace Gas Detection
- Trace Gas Detection
- Trading Turrets
- Traffic Forecast
- Training
- Training
- Training
- Training
- Training
- Training
- Training
- Training
- Training
- Training Aids
- Training Aids
- Training Manuals
- Training Seminars
- Training Simulators
- Training Simulators
- Training Systems
- Training Systems
- Transducers
- Transformers
- Transformers
- Transformers
- Transition Planning
- Translation Services
- Transmission of Digital Imagery
- Transmission Research
- Transmissions
- Transmissions
- Transparencies
- Transport System
- Transportation Control Systems
- Transportation Control Systems
- Transportation Systems (Dry & Liquid)
- Travelling Wave Tubes
- Triple Base
- Tritium Monitors
- Tritium Technology
- Tubing
- Tubing
- Tubing Assembly Fabrication
- Turbocharged Piston Aircraft Engines
- Turning
- Turning
- Turning
- Turnkey Computer Systems
- Turnkey Data Collection Systems
- Turnkey Image Processing Systems
- Turnkey Systems
- UHF
- UHF & S-Band Telemetry Trans
- UHF Radio
- Ultra Fine Metal Powders
- Ultraviolet Fluorescence Systems

COMPANY

BARRINGER RESEARCH Ltd
SCINTREX Ltd
POSITRON INDUSTRIES Inc
AVIATION PLANNING SERVICES Ltd
BENDIX AVELEX Inc
BOEING DE HAVILLAND
BRUCE D VALLILLEE
ELECTRONICS Ltd
EXCALIBUR SYSTEMS LIMITED
HONEYWELL Ltd
LITTON SYSTEMS CANADA Ltd
MATROX ELECTRONIC SYSTEMS Ltd
MPB TECHNOLOGIES Inc
PARAMAX ELECTRONICS Inc
QUANTUM INSPECTION AND
TESTING Ltd
THE AMTEK GROUP
THOMPSON-HICKLING AVIATION Inc
ATLANTIS AEROSPACE Corp
OERLIKON AEROSPACE Inc
RE:ACTION MARKETING
SERVICES Ltd
SEMICONDUCTOR INSIGHTS Inc
ATLANTIS AEROSPACE Corp
CAE INDUSTRIES Ltd
ISTEC Inc
THOMSON-CSF SYSTEMS
CANADA Inc (TCSC)
AASTRA CORPORATION
AVTECH ELECTROSYSTEMS Ltd
CANADIAN MARCONI COMPANY
RHK AERO SUPPORT Inc
THOMPSON-HICKLING AVIATION Inc
OERLIKON AEROSPACE Inc
DIPIX TECHNOLOGIES Inc

ONTARIO HYDRO
BRISTOL AEROSPACE Ltd
SPAR AEROSPACE Ltd
PLASTAL Inc
GENERAL MOTORS OF CANADA Ltd
CompEngServ Ltd

CVDS Inc

FELL-FAB PRODUCTS

VARIAN CANADA Inc
EXPRO CHEMICAL PRODUCTS Inc
SCINTREX Ltd
ONTARIO HYDRO
BOEING DE HAVILLAND
McDONNELL DOUGLAS
CANADA Ltd
NORTHWEST INDUSTRIES Ltd
CANADIAN AIRMOTIVE Inc

CAYUGA AUTOMATIC
MACHINING (1985) Ltd
DIEMASTER TOOL Inc
M'GADALE PRECISION
PRODUCTS Ltd
PRIOR DATA SCIENCES Ltd
EPIC DATA Inc

DIPIX TECHNOLOGIES Inc

WILLIAMS ESG Inc
GE CANADA Inc
CALIAN COMMUNICATIONS
SYSTEMS Ltd
CANAC TELECOM
SHERRITT GORDON Ltd
SCINTREX Ltd

KEYWORD

Ultraviolet Imagers
 Ultraviolet Testing

 Underwater Acoustics
 Underwater Instrumentation
 Underwater Ring Shell
 Sound Projectors
 Underwater Salvage
 Equipment
 Underwater Vehicles
 UNIX Optical Disk
 Unmanned Vehicle Support
 Systems
 Up/Down Converters
 Update Digital Memory
 (Radio Freq)
 Upgunned Weapon Station
 User Manuals

 Utility Outside Plant System
 Vacuum Coatings
 Vacuum Forming
 Vacuum Gas and Oil
 Quenching
 Vacuum Heat Treating &
 Brazing
 Vacuum Heat Treating &
 Brazing
 Validation Equipment
 Valve Indicators
 Valves

 Vector Graphics

 Vehicle Training Simulators

 Vehicles (Fire Support,
 Armoured)
 Vehicular Intercom Systems
 Verification of Software
 Vertical Axis Wind Turbines
 VHF
 VHF/FM
 VHF Radio
 Vibration/Acoustic Intensity
 Measure
 Video Display Systems
 Video Display Systems
 Video Display Systems
 Video Products
 Video Training (Thru-Site)
 Systems
 Video Transmission
 Virtual Cockpits
 Visual Signalling Devices
 Vitrification

 VLSA
 VLSI
 VLSI Simulation
 VME Bus

 VME Computer Modules
 Voice & Data
 Communications
 Voice & Voice/Data Switches
 Voice and Data Integration
 Voice and Signal Processing
 Voice Couplers & Repeaters
 (Digital)
 Voice Privacy
 Communications
 Voice Switching
 Voltage Transformers
 VOR

COMPANY

CANADIAN ASTRONAUTICS Ltd
ADVANCED MATERIALS
ENGINEERING CENTRE
APPLIED MICROSYSTEMS Ltd
APPLIED MICROSYSTEMS Ltd
SPARTON OF CANADA Ltd

SEI INDUSTRIES Ltd

VADEKO INTERNATIONAL Inc
KOM Inc
INDAL TECHNOLOGIES Inc

ITS ELECTRONICS Inc
TELEMUS ELECTRONIC
SYSTEMS Inc
GENERAL MOTORS OF CANADA Ltd
RE:ACTION MARKETING
SERVICES Ltd
GECVISION Corp
CAMETOID Ltd
FLEXIBULB PLASTICS INC
VIDE ET TRAITEMENT CANADA Inc

VAC-AERO INTERNATIONAL Inc

VIDE ET TRAITEMENT CANADA Inc

EXCALIBUR SYSTEMS LIMITED
SEA Ltd
AIRCRAFT APPLIANCES AND
EQUIP Ltd
RE:ACTION MARKETING
SERVICES Ltd
Ait ADVANCED INFORMATION
TECHNOLOGIES
GENERAL MOTORS OF CANADA Ltd

TELEX MAGNUM
ODYSSEY RESEARCH ASSOCIATES
INDAL TECHNOLOGIES Inc
GE CANADA Inc
SPIESBURY COMMUNICATIONS Ltd
CANAC TELECOM
UNISYS CANADA Inc

CAE INDUSTRIES Ltd
COMPUTING DEVICES COMPANY
UNISYS CANADA Inc
MATROX ELECTRONIC SYSTEMS Ltd
ATLANTIS AEROSPACE Corp

ISTEC Inc
VIRTUAL PROTOTYPES Inc
SIGMA-FLASH Ltd
WHITESHELL NUCLEAR
RESEARCH ESTAB
APPLIED MICROELECTRONICS
MICROTREL PACIFIC RESEARCH Ltd
MYRIAS RESEARCH Corp
SPECTRUM SIGNAL
PROCESSING INC
DY-4 SYSTEMS Inc
SKYWAVE ELECTRONICS Ltd

LNS SYSTEMS Inc
SHL SYSTEMHOUSE Inc
GE CANADA Inc
SPIESBURY COMMUNICATIONS Ltd

CALIAN COMMUNICATIONS
SYSTEMS Ltd
ORACLE TELECOMPUTING Inc
GARRETT CANADA
CANADIAN MARCONI COMPANY

KEYWORD

Warning Systems Digital
Waste Management

Water (Potable) Storage
Water (Potable) Storage &
Transport

Water Purification Systems
Water Quality
Water Quality Measurement
Waterpump Shaft
Assemblies

Watershed Management
Waveform Generators
Waveform Instrumentation
Waveguide Ferrite Devices
Waveguide Lasers
Waveguides
Waveguides

Weapon System Controls
Wear Resistant Materials
Weather Forecasting
Weather Forecasting
Systems

Weather Image Processor

Weather Map Displays
Weather Modification
Programs

Weather Observation
Weather Radar
Weather Stations
Webbing
Webbing Straps
Weight & Balance

Weld Overlaying
Welding
Welding
Welding
Welding

Welding
Welding
Welding

Welding (Advanced)

Welding (Fabric)
Welding (Laser)
Welding (Sheet Metal)
Welding (Stainless Foils)
Welding Procedures

Welding Technology
Wheel Parts
Whip Antennas
Winches
Wind Tunnels
Wing Actuation System
Wire (QPL & JPL Listed)
Wire and Cable
(Aircraft/Military)
Wire Harnesses
Wiring
Wiring
Wiring

Wiring & Tubing
Wiring Harnesses
Wiring Harnesses
Wiring Harnesses
Workstations (TEMPEST)

COMPANY

TEAM Inc
WHITESHELL NUCLEAR
RESEARCH ESTAB
FELL-FAB PRODUCTS
SEI INDUSTRIES Ltd

3-L FILTERS Ltd
MONITEQ Ltd
APPLIED MICROSYSTEMS Ltd
FAG BEARINGS Ltd

MONITEQ Ltd
AVTECH ELECTROSYSTEMS Ltd
AVTECH ELECTROSYSTEMS Ltd
LUCAS AEROSPACE (Microwave Div)
ULTRA LASERTECH Inc
ANDREW CANADA INC
VARIAN CANADA Inc
VICTRIX Ltd
SHERRITT GORDON Ltd
PELORUS NAVIGATION SYSTEMS Inc
MACDONALD DETTWILER AND
ASSOCIATES Ltd
MACDONALD DETTWILER AND
ASSOCIATES Ltd
LNS SYSTEMS Inc
INTERA KENTING

PELORUS NAVIGATION SYSTEMS Inc
SOFTWARE KINETICS Ltd
DEVTEK CORPORATION
FELL-FAB PRODUCTS
TUL SAFETY EQUIPMENT Ltd
INNOTECH AVIATION
ENTERPRISES Ltd
THE LASER INSTITUTE
CANADIAN MARCONI COMPANY
DEVTEK CORPORATION
HAWKER SIDDELEY CANADA Inc
INNOTECH AVIATION
ENTERPRISES Ltd
PRICE & KNOTT MANUFACTURING
CO Ltd
ROLLS-ROYCE (CANADA) Ltd
SPECIALIZED WELDING &
FABRICATION Ltd
THE LASER INSTITUTE
W R DAVIS ENGINEERING Ltd
STEVESTED MACHINERY &
ENGINEERING Ltd
FELL-FAB PRODUCTS
LUMONICS Inc
THE H I THOMPSON CO
THE H I THOMPSON CO
QUANTUM INSPECTION AND
TESTING Ltd
ONTARIO HYDRO
BENDIX AVELEX Inc
THE AEROSPACE CONSORTIUM Inc
INDAL TECHNOLOGIES Inc
DSMA INTERNATIONAL Inc
MENASCO AEROSPACE Ltd
HARBOUR INDUSTRIES (Canada) Ltd
INTERFAST Inc

NEWTECH INSTRUMENTS Ltd
BOEING DE HAVILLAND
ITT CANNON CANADA
McDONNELL DOUGLAS
CANADA Ltd
IMP GROUP Ltd
DOWTY CANADA ELECTRONICS Ltd
NORTHWEST INDUSTRIES Ltd
THE AEROSPACE CONSORTIUM Inc
EMCON EMANATION CONTROL Ltd

KEYWORD

X-Ray Inspection
X-Ray Power Supplies
Yellow Signal
Zinc Oxide Crystals

COMPANY

SPECIALIZED WELDING &
FABRICATION Ltd
VARIAN CANADA Inc
HANDS FIREWORKS Inc
CRYSTAR RESEARCH Inc

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Section II

COMPANY PROFILES

(continued)

- **Specialty Fabrication Work** – Indal Technologies is an acknowledged expert in the field of specialized aluminum structural fabrication work, and has been certified by the Canadian Welding Bureau as meeting the requirements of CSA Standard W47.2 "Aluminum Welding Qualification Code." Typical of the specialized structural design and fabrication work undertaken by Indal Technologies is a frangible ILS localizer support structure designed to break away on impact. Indal Technologies built a prototype enclosure for the new MLS antenna system scheduled to replace ILS antennas across Canada by the year 2000. Other work for Transport Canada has included the design and fabrication of a 100-ft telescopic mobile monitoring tower, design of a frangible glide path monitoring antenna mast, and range towers for coastal navigation. Other work performed by Indal Technologies in this field includes the design and fabrication of antenna support towers, the fabrication of radar reflectors, radomes, and space frame hangar systems.

- **Shipboard Helicopter Support Systems** – Indal Technologies is a world leader in the development and supply of shipboard helicopter support systems as employed on helicopter-carrying ships operated by navies and coast guards worldwide. Variants of the Indal helicopter recovery assist systems are now employed on vessels operated by the navies of Argentina, Australia, India, Japan, Spain, Taiwan, and the US. These systems include any or all of the following: helicopter recovery assist and securing transversing systems, and telescopic hangars and hangar doors. The Indal Technologies RAST (Recovery Assist, Securing and Traversing) system is a key element of the US Navy's LAMPS MK III program. Over 100 ships will be fitted with this system. A prototype system of a new configuration called ASIST, an acronym for Aircraft Ship Integrated Secure and Traverse System, has been assembled and tested at Indal Technologies' plant. This new system will revolutionize helicopter ship operations in such areas as cost, weight, space, complexity, integrated logistics support, reliability and maintainability, and mission time requirements. Indal Technologies is the originator of the unique telescopic helicopter hangar that is employed on many navy and coast guard vessels that have flight deck space limitations. About 200 hangars and 400 hangar doors supplied by the company are in service with numerous agencies, principally the US Navy, US Coast Guard, and Canadian Coast Guard.

- **Vertical Axis Wind Turbines** – Indal Technologies has been a world leader in the design and manufacture of vertical axis wind turbines (VAWT) for over 10 years. The Indal Technologies 50 kW unit is the most technically advanced and proven VAWT in the world today. 500 kW machines are now also in operation.

- **Cable Handling Systems** – IT's Fathom Oceanology product line includes lightweight dipping sonar winches, torpedo decoy handling systems, and integrated systems such as tactical towed line array and variable depth sonar handling systems used by the navies of Italy, Norway, Singapore, and Sweden. ITI is now the world's leading supplier of handling systems for active towed sonars. In conjunction with Plessey Naval Systems and the Canadian Government, the company has developed a lightweight and high performance dipping sonar winch for the airborne Cormorant sonar. The system has undergone extensive testing by the Canadian and United States Navies. Fathom also manufactures the "Nixie" torpedo decoy handling system for the Canadian Navy.

- **Unmanned Vehicle Support Systems** – ITI developed artificial vision systems to enable accurate landing of unmanned air vehicles (UAV) on naval vessels at sea, as well as vision systems launch/recovery platforms, system pre-flight checking, and vehicle transporting by remote control. ITI is participating with US Joint Program Offices and NATO to establish standards for precise UAV recovery and handling.

- **Aerospace Components** – ITI produces the HI Thompson product line of components for thermal, acoustic, and personnel shielding applications in the aerospace, defence, power generating, heavy equipment, and marine equipment fields.

- **Program Management and Quality Control** – Indal Technologies has developed the appropriate project management control systems to administer large military contracts and is fully familiar with all aspects of government contracting. Quality assurance procedures are maintained in accordance with CSA Standard Z 299.2, and AQAP-1 requirements (equivalent to MIL-Q-9858A) are also met. There is a resident DND inspector staff based at the Indal Technologies' plant. Production scheduling, material requirements, and financial analyses are all controlled by a computer-based system which is capable of handling all work in progress at any one time.

AVERAGE WORK FORCE: Engineering – 52
Production – 146
Administration – 97

GROSS SALES: 1988 – \$50.0M
1989 – \$50.0M

Export sales represent more than 80% of Indal Technologies' annual sales of which a large percentage is for the US military, principally the US Navy.

PLANT SIZE: 200,000 sq ft (manufacturing plant)
50,000 sq ft (office complex)
(at 3 locations)

EXPERIENCE: The majority of Indal Technologies' sales are made to government customers, either directly or through a third party subcontract. Principal customers include the navies and coast guards of Canada, Finland, India, Japan, Singapore, Spain, Sweden, the US, Australia, and other allied nations in Europe and Latin America.

REVISED: Mar 90

INDUSTRIAL RUBBER Co

ADDRESS: PO Box 938
Bathurst, New Brunswick
Canada E2A 4H7

CONTACT: Mr Barry Kyle, General Sales Manager
Tel: (506) 548-3325
Fax: (506) 548-1080

KEYWORDS: Armored Vehicles; Road Wheels and Tracks.

HISTORY: Industrial Rubber Co is a manufacturing company that caters to the Department of National Defence, mining, pulp and paper, fishing, and food industries.

CAPABILITY: The company provides all types of rubber molding and rubber lining from the toughest abrasion and corrosion application to chemical resistant and wear protection. A highly-qualified staff is available to provide in-plant and/or field service.

- **Products and Services** – Armored track road wheels, armored track support rollers, armored track pads, and chute, pipe, and tank lining.

- **Quality Control Programs** – AQAP 9 and 4 and MIL-I-45208A.

AVERAGE WORK FORCE: 19

GROSS SALES: No data.

PLANT SIZE: 16,800 sq ft

EQUIPMENT: High pressure autoclaves (2), specialized molding equipment, extruders, presses, painting booths and equipment, testing equipment, high-pressure boilers, burners, buffers and cutting equipment, and sandblasting facilities.

EXPERIENCE The companies customers include the Department of National Defence, Oil Inc, Mines Gaspé, Brunswick Mining & Smelting, Dorr-Oliver, and Schionning & Arve.

REVISED: Apr 90

INGADALE PRECISION PRODUCTS Ltd

ADDRESS: 48 Crockford Blvd
Scarborough, Ontario
Canada M1R 3C3

CONTACT: Mr Horst Mosgoll, President
Tel: (416) 752-6266
Fax: (416) 752-2982

KEYWORDS: Machining; Precision Machining; Turning; Milling; Grinding; CNC Machining; Tool Fabrication, Die Fabrication, Coatings (Chemical); Testing (Salt Spray); Testing (Humidity)

HISTORY: Incorporated in 1967, Ingadale Precision Products Ltd is a wholly Canadian-owned company originally specializing in the manufacture of stamping dies, tooling fixtures, and custom prototypes. Later Ingadale applied close-tolerance tool-making technology to a rapidly expanding market for precision components.

CAPABILITY: Ingadale is a successful supplier of custom, high-precision, machined components to the aircraft/aerospace, military, computer, high-tech, and commercial markets. Utilizing state-of-the-art CNC technology, highly skilled technicians, and stringent control standards (AQAP 4, DND 1016, and CSA Z 299 3), Ingadale also maintains in house passivation (QQ-P-35B), chemical conversion treatment (MIL-C-5541C), and testing (ASTM-B-117) to guarantee processing control. Supplementing their CNC capabilities, Ingadale utilizes its fully-equipped, conventional machine shop to eliminate production bottlenecks.

AVERAGE WORK FORCE: Engs & Tech - 3
Staff - 8
Production - 40

GROSS SALES: 1988 - \$3.4M
1989 - \$3.9M

PLANT SIZE: 28,000 sq ft

EQUIPMENT: 7 CNC lathes, max size 15" dia x 24" lg, 18 CNC milling centers, max size 24" x 40" x 18"; 5 conventional lathes, max size 27" dia x 120" lg; 15 conventional mills, 3 external grinders, 3 internal grinders; 3 100 KVA spotwelders; 1 coordinate measuring machine; Mitutoyo #F805, 1 Mitutoyo shadow graph; 1 Lincoln hardness tester.

EXPERIENCE: Ingadale's customers include Supply and Services Canada, Spar Aerospace Limited, Allied-Signal Aerospace Canada, Menasco Aerospace Limited, Indal Technologies Inc, Canadian Marconi Co, Dowty Canada Electronics Ltd, Fleet Industries Ltd, Leigh Engineering and Aerospace Div, Collins Radio Group-Rockwell International, Hawker-Siddeley-Orenda Div, Tecmotiv Inc, Com Dev Limited, Magna Electronics Ltd, and Bendix Corp

REVISED: Mar 90

INNOTECH AVIATION ENTERPRISES Ltd

ADDRESS: (Head Office)
595 Stuart Graham Blvd
Dorval, Quebec
Canada H4Y 1E3

CONTACT: Mr Mark Goldenberg, Manager Corporate Relations
Tel: (514) 636-8484
Fax: (514) 636-8887

KEYWORDS: Aeronautical Engineering; Avionics; Corrosion Control; Electrical Engineering; Electronic Warfare; Modification (Aircraft); Non-

Destructive Testing; Painting (Aircraft); R&O (Aircraft); R&O (Helicopters); Sheet Metal Fabrication; Structural Design; Systems Flight Testing; Systems Ground Testing; Systems Installation Design; Systems Integration; Weight & Balance; Welding.

HISTORY: Innotech Aviation Ltd was incorporated in 1955 as Timmins Aviation Ltd. In 1967, the latter was acquired by Atlantic Aviation Corp of Wilmington, Delaware, resulting in a further name change to Atlantic Aviation of Canada Ltd. The present name came into being in 1974 when a group of the company's Canadian executives, together with Innocan Investments Ltd, purchased the shares held by Atlantic Aviation Corp. The company was sold in 1988 to IMP Aerospace Limited. The company has offices and aircraft service facilities in 4 Canadian cities: Vancouver, Toronto, Montreal, and Ottawa.

CAPABILITY. The current operating divisions of Innotech Aviation Ltd include Aircraft Sales and Brokerage, Aircraft Management Services and Charter Operations, Technical Services, and Remote Sensing. This profile describes only the Technical Services Division which consists of:

- **Engineering and Design** - A full range of aerospace-related engineering services are offered which include repair schemes; corrosion control; weight and balance; systems installation design, aeronautical engineering, aircraft maintenance; modification development, structural design, electrical and avionics engineering, systems interface design, systems ground and flight testing, and custom designed aircraft interiors for commercial and military aircraft including executive transport, air evacuation, and hospital interiors; plus maintenance and technical publications for a wide range of commercial and military aircraft.

- **Aircraft Repair & Overhaul** - This department's maintenance and service capabilities cover twin engine aircraft, multi-engine turbo-props, turbo jets, and helicopters for civilian and military customers, as well as a full range of equipment modifications and non-destructive testing.

- **Modification** - This department specializes in sheet metal work, aircraft welding, aircraft painting, cabinet making, and upholstery of aircraft interiors and furnishings. As well, this department installs the avionics systems, electronic warfare systems, and auxiliary power units described in "Engineering and Design".

- **Quality Assurance** - Innotech's quality assurance personnel hold Canadian Department of Transport (DOT) and the Department of National Defence (DND) AQAP 1 shop approvals. All aircraft inspectors are licensed by DOT and, thence, through agreements between Canada and other countries, can approve work done for customers from outside Canada.

AVERAGE WORK FORCE: Total - 600

GROSS SALES: 1988 - \$60.0M
1989 - \$67.0M

PLANT SIZE: 500,000 sq ft

EXPERIENCE. Innotech Aviation customers include the US Coast Guard (Falcon Aircraft), Canadian Department of National Defence (and other departments of the Canadian Government), Canadian, deHavilland Aircraft of Canada, Government of Malaysia, and many other corporate operators.

REVISED: Mar 90

INTERA KENTING

ADDRESS: 380 Hunt Club Road
PO Box 8250 Terminal PO
Ottawa, Ontario
Canada K1G 3H7

CONTACT: Don Fitzsimmon, Vice President, Marketing
Glen Hildreth, Manager Resources Group
Tel: (613) 521-1630
Fax: (613) 521-5913

KEYWORDS Data Integration, Data Processing, Digital Image Analysis, Mission Planning, System Analysis, Data Simulation, Artificial Intelligence Methods, Integrated Surveys, Weather Modification Programs, Geographic Information System, Natural Resource Development, Resource Management, Magnetic Surveys, Radiometric Surveys, Aeromagnetic Gradiometer, Geophysical Services

HISTORY Intera Kenting is a division of Intera Corporation of Calgary, a Canadian owned, high-technology, remote sensing and mapping company. Intera Kenting evolved from a merger of Intera Technologies, the world's largest supplier of airborne remotely sensed data specializing in radar and thermal infrared, and Kenting, one of the most established and respected suppliers of airborne geophysical, photogrammetric, geographic information system and resource development services.

CAPABILITY Intera Kenting is involved in remote sensing field, by innovating new methodologies that address a full range of services from data acquisition to data analysis and integration. Services in remote sensing include mission planning, data acquisition, digital image analysis, training and technology transfer, forest inventory mapping and monitoring, geological mapping analysis for exploration, ice mapping, and dynamics modelling.

Intera Kenting operates an integrated surveys and mapping division; the firm has capabilities in the compilation, analysis, display, and management of geo-referenced data. The company undertakes all phases of mapping projects from aerial photography and control surveys through the preparation of reproduction graphics and computer compatible map data. Intera Kenting provides data acquisition and processing services in support of the development and management of spatially related resources and facilities. In the field of geophysics, Intera Kenting has flown over 25 million line kilometers of airborne geophysical surveys around the world. Surveys have been of the large regional type (such as the country wide surveys of Ivory Coast and Thailand). All Intera Kenting magnetic sensors are of the cesium vapour type utilized for both airborne data acquisition and concurrent monitoring on the ground. Radiometric surveys utilize state-of-the-art detector volumes up to 50 liters. Multi sensor surveys are conducted utilizing integrated system of magnetometer, spectrometer, and VLF-EM units.

Geophysical services include complete data processing capability for all types of airborne survey data in addition to the capability of processing previously acquired analog data to digital format. Both qualitative and quantitative interpretations of airborne survey results are available utilizing computer programs modified or developed by Intera Kenting.

In waste management, Intera Kenting utilizes an integrated multidisciplinary approach to the investigation, analysis and planning aspects of waste management. The company provides complete environmental consulting services in the site, design, and closure of municipal landfills and industrial waste disposal sites.

The Resource Consulting Group of the firm used wide variety of mapping and remote sensing techniques to distinguish land use and land patterns. Comprehensive inventories have been compiled in conjunction with many planning projects including the creation of resource-related geographic information system. Advisors in a wide range of specialties, including law, economics, accountancy, training, community development, engineering, agriculture, and forestry, provide technical assistance for rural development.

AVERAGE WORK FORCE: PhD - 3
Engs - 9
Prof - 28
Others - 94

GROSS SALES: 1988 - \$41.55M
1989 - \$49.70M

PLANT SIZE: 21,000 sq ft

EQUIPMENT: Data processing subsystems (STAR-1/2 processor, SLAR processor, IR processor, digital video processors, etc.). Image processing and analysis systems (ERIS III (2), MAGIC, MIDAS, IPPS, DMAS, STARVUE). Sensors, single channel linescanner, dual channel linescanner, laser profilometer. Three aircraft with sophisticated navigation

systems include Canadian Marconi Dopplers and Sperry C21 compass system, kinematic GPS system, Wild and Zeiss aerial camera systems, and two Deadelus digital imaging scanners. Mini- and microcomputer facilities include Hewlett Packard 1000 A900 series and F65 series, Digital Equipment Corp Micro VAX II, IBM System 36, Intergraph Interpro 120, and IBM PC compatible 386, 286, 80C86, and XT. Associated facilities include terminals, printers, and disks. Data acquisition equipment includes photogrammetric (WILD A10 Autograph, WILD A8 Stereoplotter, WILD PUG 4 Precision Point, transfer device), digitizing tables, and plotting equipment. Complete in-house photographic laboratory with film processors, printers, contact frames, reproduction cameras, and enlargers.

EXPERIENCE. Present customers include the US Geological Survey, Canadian Department of National Defence, Canada Centre for Remote Sensing, the UK Royal Aeronautic Establishment, and other academic, commercial, and government organizations throughout the world.

REVISED: Mar 90

INTERACTIVE CIRCUITS & SYSTEMS Ltd

ADDRESS: 5430 Canotek Road
Gloucester, Ontario
Canada K1J 9G2

CONTACT: Dr D Roy, President
Tel: (613) 749-9241
Fax: (613) 749-9461

KEYWORDS Electronic Design, Data Acquisition, DSP, Processing (Sensor), Processing (Signal), Processing (Radar), Processing (Sonar), Processing (EW).

HISTORY Interactive Circuits and Systems (ICS) is a Canadian-owned, high technology electronics company founded in 1980.

CAPABILITY: ICS offers unique expertise in the design and manufacture of high-speed digital signal processing and data acquisition equipment for applications in sonar, radar, EW, and off-the-shelf and custom products. At present, the standard products include a family of VMEbus real-time digital signal processing and data acquisition boards. ICS also offers a complete line of sonar signal processing equipment as standard products. The company's SBF-256 system, which performs in excess of 2 billion arithmetic operations/sec is considered to be the world's most powerful sonar beamformer. ICS also provides custom R&D services to government and defense industries in the development of advanced systems in radar, sonar, EW, space, and other areas. In the past, the company has successfully developed such sophisticated systems as a Digital EW Receiver, Phased Array Radar Beamformer, Star-Tracker for Satellite Navigation, Space-Mirror Calibration system, 3-D Sound System for aircraft cockpit applications, etc.

AVERAGE WORK FORCE: PhD - 1
MEng - 1
BEng - 4
Others - 10

GROSS SALES: 1988 - \$1.4M
1989 - \$2.0M (est)

PLANT SIZE: No data.

EQUIPMENT: No data.

EXPERIENCE: ICS has a highly diversified international customer base including - NATO (Italy), DREO (Canada), DREA (Canada), DREV (Canada), NADC (US), NOSC (US), NUSC (US), NSA (US), NASA (US), Lockheed (US), TRW/ESL (US), GTE (US), Ford Aero (US), GM (US), and Unisys (US), etc.

REVISED: Mar 90

INTERCON CONSULTANTS

ADDRESS: 275 Slater Street, Suite #705
Ottawa, Ontario
Canada K1P 5H9

CONTACT: Mr R Campbell, Partner
Tel: (613) 236-4451
Fax: (613) 230-8707

KEYWORDS: Consulting (Government Procurement); Consulting (Canadian Government); Consulting (Aerospace); Joint Ventures; Industrial Benefits; Offsets

HISTORY: InterCon Consultants is an Ottawa-based consulting firm. The partnership was founded in 1983 to assist and advise companies, domestic and foreign, in doing business with the Federal Government.

CAPABILITY: InterCon Consultants' clients are primarily defence, communications, and energy companies seeking contracts with the Federal Government and, in the case of foreign companies, with the Canadian private sector. The latter may be in the form of purchases, sales, or joint ventures, licensing arrangements, or takeovers. The partners and associates of the company are experienced in government and industry.

AVERAGE WORK FORCE: No data.

GROSS SALES: No data.

PLANT SIZE: No data.

EQUIPMENT: No data.

EXPERIENCE: InterCon Consultants' clients include large foreign and Canadian aerospace and defence companies, a large space industry company, and a nuclear industry company. The company has associate firms in Europe and the US.

REVISED: Mar 90

INTERFAST Inc

ADDRESS: Toronto
Head Office
21 Constellation Court
Rexdale, Ontario
Canada M9W 1K4

Montreal
191B Avenue Labrosse
Pointe-Claire, Quebec
Canada H9R 1A3

Vancouver
7-3691 Viking Way
Richmond, British Columbia
Canada V6V 1N6

CONTACT: Mr S Douglas Woollings, President and General Manager
Tel: (416) 674-0770
Fax: (416) 674-5804

KEYWORDS: Fasteners (Precision); Wire and Cable (Aircraft/Military).

HISTORY: Since inception in 1966, Interfast has been the leading Canadian supplier for aerospace precision fastener systems representing Allfast Fastening Systems Inc, Blanc Aero Industries, Briles Rivet Corp, Deutsch Fastener Corp, Deutsch Metal Components, Dzus Fastener Company Inc, Freeman Company, Hi-Shear Corp, General Aircraft Supplies, Mercury Aerospace Division of Blanc Aero Industries, Monogram Aerospace Fasteners, Rexnord Aerospace Mechanisms (RAM), Rexnord Specialty Fasteners Division with Camloc and Tridair products, Ruair Bearing Co, TA Mfg Corp, Toronto Fastener Industries (Forfas), BFM Transport Dynamics, and Western Sky Industries. They also supply

custom engineered systems representing Continental Forge Co, Kaiser Electroprecision, Kaiser-Roylyn, Stainless Steel Products Inc, Teledyne Thermatics, and Tyee Aircraft Inc. The company supplies aerospace and industrial tooling representing Aerospace Tools Div of Voi-Shan, Air Tuf Products Inc, CompTool, Deutsch Metal Components, Hemco Corporation, L&F Industries, Lok-Fast Inc, Monogram Aerospace Fasteners, P V Tool Inc, Schaefer Machine Company, E A Selzer & Associates, Superior Carbide Tools, and Zephyr Manufacturing Co. They also supply high tech wire and cable to Teledyne Thermatics.

AVERAGE WORK FORCE: Technical Sales Reps - 23
Quality Assurance - 4
Inside Sales Support Staff - 28
Other Support Staff - 49

GROSS SALES: 1988 - \$15M
1989 - \$18M

PLANT SIZE: 35,000 sq ft (warehouse)
15,000 sq ft (offices)

EQUIPMENT: Computerized inventory and order systems, bar coding, specialized quantity packaging, Telex, TWX, and FAX

EXPERIENCE: Since 1966, Interfast has been serving customers including Government of Canada (DND), McDonnell Douglas, Canadair, Boeing Aircraft, Pratt & Whitney Canada, Swiss Federal Air Force, Bell Helicopter, Raytheon Canada, Aerospatiale, MBB Helicopter Canada, Spar Aerospace, IBM, Garrett, Textron, and Litton Systems Canada.

REVISED: Mar 90

INVAR MANUFACTURING Ltd

ADDRESS: 1 Parry Drive
Batawa, Ontario
Canada K0K 1E0

CONTACT: Mr M Mainville, General Sales Manager, Precision Machined Products and Systems
Tel: (613) 398-6106
Fax: (613) 966-7932

KEYWORDS: Machining; Precision Machining; Plate & Sheet Metal Fabrication; CAD/CAM; NC/CNC Equipment.

HISTORY: Effective 5 Jan 87, the assets of Bata Engineering Division have been purchased by Invar Manufacturing Ltd. Invar Manufacturing Ltd is a newly formed company owned by Haspear Holding Inc which is a subsidiary of Linamar Machine Ltd, Guelph, Ontario, Canada. Invar Manufacturing Ltd will operate with the same experienced management team that was instrumental in achieving the high standards for which Bata Engineering Division was well known.

Based on their ongoing capital equipment acquisition program which includes a heavy concentration of NC/CNC machines, they intend to broaden their base of activities to include aircraft/aerospace, military/defense, nuclear/CANDU industries, commercial/off-road equipment; and transportation/light rapid transit systems

CAPABILITY: Invar Manufacturing Ltd is primarily involved in the manufacture of precision-machined products and systems using the latest state-of-the-art manufacturing technology. Complementing this capability is a high-quality, sophisticated, plate and sheet metal fabrication facility

- Aircraft - Invar Manufacturing continues to supply flap fittings, splice fittings, carriers, kick fittings, and jack fittings for the DC-9, MD-80, DC-10, and MD-11 aircraft as well as engine components (impellers, covers, discs) and hubs and spacers (landing gear components, inner and outer piston cylinders)

- Military - Invar's military production for US ground support vehicles includes a complete range of military hydraulic cylinders, power assist assemblies, gear boxes, and individual components. In addition, they fabricate ammo racks, ammo conveyors, and ammo stackers for the M109/FAASV support vehicle.

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AVERAGE WORK FORCE No data.

GROSS SALES No data.

PLANT SIZE No data.

EQUIPMENT No data.

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Richmond, British Columbia
Canada V6V 1N6

CONTACT Mr S Douglas Woolings, President and General Manager
Tel: (416) 674-0770
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custom engineered systems representing Continental Forge Co, Kaiser Electroprecision, Kaiser-Roylyn, Stainless Steel Products Inc, Teledyne Thermatics, and Tyee Aircraft Inc. The company supplies aerospace and industrial tooling representing Aerospace Tools Div of Voi-Shan, Air Tuf Products Inc, CompTool, Deutsch Metal Components, Hemco Corporation, L&F Industries, Lok-Fast Inc, Monogram Aerospace Fasteners, P V Tool Inc, Schaefer Machine Company, E A Selzer & Associates, Superior Carbide Tools, and Zephyr Manufacturing Co. They also supply high tech wire and cable to Teledyne Thermatics.

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Quality Assurance - 4
Inside Sales Support Staff - 28
Other Support Staff - 49

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1989 - \$18M

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REVISED: Mar 90

INVAR MANUFACTURING Ltd

ADDRESS: 1 Parry Drive
Batawa, Ontario
Canada K0K 1E0

CONTACT: Mr M Mainville, General Sales Manager, Precision Machined Products and Systems
Tel: (613) 398-6106
Fax: (613) 966-7932

KEYWORDS: Machining; Precision Machining; Plate & Sheet Metal Fabrication; CAD/CAM; NC/CNC Equipment

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Based on their ongoing capital equipment acquisition program which includes a heavy concentration of NC/CNC machines, they intend to broaden their base of activities to include aircraft/aerospace, military/defense, nuclear/CANDU industries; commercial/off-road equipment; and transportation/light rapid transit systems.

CAPABILITY: Invar Manufacturing Ltd is primarily involved in the manufacture of precision-machined products and systems using the latest state-of-the-art manufacturing technology. Complementing this capability is a high-quality, sophisticated, plate and sheet metal fabrication facility

- **Aircraft** - Invar Manufacturing continues to supply flap fittings, splice fittings, carriers, kick fittings, and jack fittings for the DC-9, MD-80, DC-10, and MD 11 aircraft as well as engine components (impellers, covers, discs) and hubs and spacers (landing gear components, inner and outer piston cylinders).

- **Military** - Invar's military production for US ground support vehicles includes a complete range of military hydraulic cylinders, power assist assemblies, gear boxes, and individual components. In addition, they fabricate ammo racks, ammo conveyors, and ammo stackers for the M109/FAASV support vehicle.

- Nuclear – Working in cooperation with AECL, major equipment is machined, assembled, and tested at their Batawa facility for the Canadian CANDU Reactors.

- Commercial – Commercial production meets the rigid demands required in the construction, forestry, and mining industries and off-road equipment. This production includes tie struts and steer and hoist cylinders ranging in size from 2 to 14 in inside diam with lengths from 12 in to 20 ft. Other commercial products include machining of V-1, V-6, and V-8 engine blocks and fly wheel covers.

- Transportation – This area of production is dedicated to the manufacture, assembly test, and supply of trucks (undercarriage) to railway specific applications for the Light Rapid Transit System serving Toronto, Vancouver, and Detroit, Michigan

AVERAGE WORK FORCE: Engineering – 10
Marketing – 12
Accounting – 7
Production (direct & indirect) – 295
QA/QC – 18

GROSS SALES: 1988 – \$23.2M
1989 – \$31.7M

PLANT SIZE: 284,000 sq ft

EXPERIENCE: Invar Manufacturing Ltd does business with an extensive list of contractors associated with the defense, aerospace, nuclear energy, commercial, and transportation community.

REVISED: Mar 90

IOTEK Inc

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Tel: (902) 420-1890
Fax: (902) 420-0674

KEYWORDS: Signal Processing Hardware, Signal Processing Software, Raster Graphics Display Systems; Man-Machine Interface; Sonar Systems; System Integration Field Service, Documentation.

HISTORY: Iotek was incorporated in Nova Scotia, Canada, in April 1986 as a spin-off from a local university owned research organization. The company has experienced steady growth out of its own resources to reach its current size.

CAPABILITY: Iotek designs, manufactures, and services specialized hardware and software for application in advanced sonar and radar systems. The company has demonstrated capabilities in high-speed signal processing. At the present time, the company manufactures a commercial version of the AN/UYS 501 signal processor. In addition, it provides full support capabilities, including applications programming assistance. High resolution (2048x2048) graphics display systems are utilized in the implementation of the man-machine interface for various sonar systems. The company maintains an intensive internal research and development program in the area of high-speed digital electro-optic circuits with specific emphasis on gallium arsenide-based devices. Recently, a new production facility has been established. This is capable of producing through-hole and surface-mount electronic assemblies to AQAP04 level quality assurance standard. Finally, the company maintains a customer service and support capability. This includes repair, maintenance, documentation, and training services. Iotek maintains a current industrial security clearance to the SECRET level. In addition, all Iotek staff have current security clearances.

AVERAGE WORK FORCE: Technical – 25
Others – 6

GROSS SALES: 1988 – \$1.5M
1989 – \$2.3M

PLANT SIZE: 10,000 sq ft

EQUIPMENT: In addition to conventional electronic laboratory equipment, the company operates a specialized, high-speed, digital signals laboratory. This lab is located in an electrically isolated TEMPEST-qualified, shielded room. Specialized test equipment includes a Tektronics 20 GHz digital sampling oscilloscope, 5 GHz Colby Instrument Pulse Generator, and additional specialized test equipment for working with digital and optical circuits at microwave frequencies. The company maintains an extensive in-house computer system based on Sun 3 machines. Computer-aided design software tools are in place as are software development tools. The production department incorporates a drag soldering machines, vapor degreaser with solvent recovery still, IR reflow surface mount soldering machine, and a variety of assembly rework and test equipment. Quality control is assisted through a variety of specialized inspection equipment. Iotek maintains a 56Kbaud synchronous data line into a local defense research establishment in support of the company's development activities.

EXPERIENCE: The major customer for Iotek's products and services has been the Canadian Department of National Defence. Within DND, client groups include Naval Engineering Unit; Defence Research Establishment Atlantic; Defence Research Establishment Ottawa; Directorate Maritime Combat Systems; and Chief, Research and Development.

REVISED: Apr 90

IRVIN INDUSTRIES CANADA Ltd

ADDRESS: PO Box 280
Fort Erie, Ontario
Canada L2A 5M9

CONTACT: Mr John D Swanigan, President and General Manager
Tel: (416) 871-6510
Fax: (416) 871-6534

KEYWORDS: Protective Equipment, Air Delivery Systems, Personnel Survival Equipment; Personnel Restraint Equipment; Parachutes; Precision Opening Release Systems; Inflatable Life Support Systems; Special Purpose Parachutes; Recovery Systems; Deceleration Systems; Drone Recovery Systems, Protective Clothing, Survival Kits.

HISTORY: Irvin Industries was incorporated in Canada in 1925 and is a subsidiary of Irvin Aerospace Ltd of Bedford, UK. The parent company not only operates many facilities in the US and one in Canada, but also in the UK and Italy, and licensees in West Germany and Japan.

CAPABILITY: Irvin Industries produces personnel parachutes (back and seat-type for ejection seats, military search and rescue units, paratroopers and military freefall, including High Glide Tactical Parachute systems), precision opening release systems, aerial delivery systems, and inflatable life support systems. Irvin has also designed and manufactured special-purpose parachutes including sophisticated recovery systems for supersonic jet transports and multi-use, high-reliability, and patented deceleration systems for fighter aircraft.

Recent new product developments from Irvin Canada include air dropable, sea rescue systems, military freefall parachutist's altimeter, mechanical dereefers for cargo parachute applications, and personnel equipment lowering systems for military parachutists.

Irvin's Production Department is equipped with more than 350 sewing machines capable of efficiently stitching the latest natural and man-made fabrics, tapes, and webbings. Added to this are quality control test machines, cloth laying and cutting tables, grommet and eyelet machines, and jigs and fixtures to enable the company to produce highly dependable and durable life support equipment.

Additionally, an environmentally-controlled facility equipped with modern environmental test chambers, jigs, fixtures, and inspection equipment accommodates the assembly, inspection, and customer servicing of the FF-2 "Hilefinder" automatic parachute opening device.

A further enhancement to Irvin's capabilities in the inflatable products line has been realized through the firm's recent acquisition of the latest in frequency stabilized electronic heat sealing equipment. This advanced state-of-the-art production equipment now permits both prototype development and large-scale manufacture of an extended range of inflatable products including life vests and jackets, impact attenuation bags, anti-g suits, and partial pressure vests. Heat sealing techniques are likewise being applied to make product improvements upon Irvin's existing line of inflatables produced previously by conventional means.

Irvin's quality control program has been designed to conform with NATO/Canadian Forces Specification AQAP-1 requirements. The quality audits conducted by independently assigned specialists, as well as full-time, in-house quality assurance representatives assigned by the Department of National Defence, provide for the surveillance of Irvin's quality control program. Irvin Industries Canada Limited has been listed by the military as an "approved" company since December 1938.

Irvin's Engineering Department is responsible for all projects from the proposal stage to production. This encompasses design, development, static testing, aerial and dynamic testing, drawing approval, preparation of procedures and specifications, and approval of the first-off specimen. Preliminary design work is facilitated by an in-house computer which is capable of simulating tests, thereby avoiding extensive trial and error testing. They also maintain Drafting and Customer Service/Product Support Departments.

Irvin's products include space vehicle recovery, drone recovery, missile recovery, deceleration (for high-performance aircraft) systems, personnel parachute systems, special purpose parachutes (precision opening and release systems), air cargo delivery systems, and other miscellaneous items such as harnesses, belts, protective clothing, special suits/clothing, life rafts, and survival kits.

AVERAGE WORK FORCE: 200

GROSS SALES: 1988 - \$10.3M
1989 - \$11.1M

PLANT SIZE: 65,000 sq ft

EQUIPMENT: No data.

EXPERIENCE: Irvin's customers include the USAF (FF-2 Hitefinder Automatic Parachute Release Mechanism, Vacuum Test Chamber), US Army (FF-2 Hitefinder), the Canadian Department of National Defence, Canadair, Fleet Industries, MBB Helicopter Canada Ltd, and many other off-shore customers (primarily military).

REVISED: Mar 90

ISTEC Inc

ADDRESS: 1810 Hwy 6 North
Hamilton, Ontario
Canada L9J 1H2

CONTACT: Mr Lee Bieman, or Mr Michael Wlodek
Tel: (416) 529-5132
Fax: (416) 529-5311

KEYWORDS: Sensors, Cameras, Surveillance, Video, Stabilization, Gimbals, Gyrostabilization, Infrared Imager, Thermal Imager, Low Light Level Television, Airborne Sensors, Marine Surveillance System, Coastal Patrol Sensors, Airborne Camera Platforms, Zoom Lens, Training Systems, Video Transmission, Servo Control Engineering, Systems Engineering.

HISTORY: Istec is a Canadian-owned corporation located in Hamilton, Ontario, approximately 40 miles west of Toronto.

Originally formed in 1974, Istec was created after patents and inventory for the "Wescam" gyrostabilized sensor platform were purchased from Westinghouse, Canada. Istec continues to develop and refine stabilization techniques for moving vehicles (land, sea, and air) while incorporating new imaging products into systems as they evolve.

Wescam Systems International is a technical support and rental operation for Istec's airborne systems with facilities in California and Florida.

Law Enforcement Aviation Services (LEAS) provides similar support to the police and security market as well as consulting services. LEAS is based in California.

CAPABILITY: Istec is the world's leading manufacturer of gyrostabilized platforms for all types of sensor packages. The product line includes platforms that are suitable for a wide range of cameras and lenses. Selection from the product line is made depending on the degree of stabilization required and weight/volume requirements. Istec currently manufactures four standard stabilized gimbals product lines. These products are the 12DL (14" outside diameter), 24DL (24" OD), 32DL (32" CD) and the 36DL (36" OD) series of stabilized sensor platforms. Istec offers complete turnkey surveillance systems for both airborne and maritime applications.

AVERAGE WORK FORCE: PhD - 2
Engs - 10
Others - 35

GROSS SALES: 1989 - \$3.4M

PLANT SIZE: 22,000 sq ft

EQUIPMENT: The company's equipment includes a full complement of manufacturing and inspection equipment and a full complement of electrical and mechanical CAD systems.

EXPERIENCE: The company has sold over 70 systems worldwide to government and commercial organizations including the US Navy and US Air Force.

REVISED: Mar 90

ITL CIRCUITS (Integrated Technology Ltd)

ADDRESS: 90 Don Park Road
Markham, Ontario
Canada L3R 1C4

CONTACT: Mr Derk Wissink, Director of Sales and Marketing
Tel: (416) 475-6658
Fax: (416) 475-5097

KEYWORDS: Photoplatting; Printed Circuits; Surface Mount; Flexible Circuitry.

HISTORY: ITL has been building printed circuit boards since 1970 and is one of the most dynamic manufacturers in Canada, as evidenced by the ambitious and progressive program of equipment and facilities expansion.

CAPABILITY: To meet the ever-growing needs of our customers, ITL has developed expertise and production capability in the following major circuit technologies: fine line, multi-layer and double side boards; flexible circuitry; exterior heat sink boards; dry film solder mask; photo-imageable solder mask; and solder core boards. These technologies, combined with UL certification and MIL-P-55110 qualification for class I, II, and III boards, demand a high-level of engineering expertise, operator skills, process controls, and stringent quality control procedures.

AVERAGE WORK FORCE: Engs - 10
Others - 95

GROSS SALES: 1988 - \$12.2M
1989 - \$15.0M

PLANT SIZE: 42,000 sq ft

EQUIPMENT Class 10,000 clean room environment for dry film application and imaging, state-of-the-art exposure equipment, use of semi-aqueous (and aqueous) dry film for imaging with both solvent and aqueous dry film solder masks, dry film solder mask application equipment (vacuum laminator), hot air solder levelling (HASL) equipment for SMOBC boards, in-line conveyORIZED pre-cleaner, IR fuser and post cleaner systems for fused tin/lead boards, conveyORIZED pumice scrubber for cleaning copper surfaces prior to photo-imaging and solder mask application, modern CNC drilling and routing equipment, associated computerized optical programming center, "real-time" X-ray equipment to ensure accurate hole-to-pad relationships on multi-layer boards, CIBA-GEIGY photo-imageable solder mask process.

EXPERIENCE: Raytheon, Litton Systems, Santa Barbara Research Center, and Electrospace.

REVISED: Mar 90

ITS ELECTRONICS Inc

ADDRESS: Microwave Components and Subsystems
200 Edgeley Blvd Unit 24
Concord, Ontario
Canada L4K 3Y8

CONTACT: Mr Ilya Tchaplja, President
Tel: (416) 660-0405
Fax: (416) 660-0406

KEYWORDS: Satellite Subsystems; Radar Subsystems; Navigation Subsystems; EW, ECM Subsystems; Mobile Satellite Subsystems; Microwave Hybrids 9HMIC; Remote Sensing Subsystems; Altimeter Subsystems; Oscillators and Oscillator Subsystems; Power Amplifiers; Up/Downconverters; Integrated Receiver Front Ends; Dielectric Resonator Oscillators; Phase Locked Loop Oscillators; Switchable Oscillator Banks; Frequency Sources (High Power); Retrofit Solid State Components; Power Dividers; Interference and Crosspolarization Cancelers

HISTORY: ITS Electronics Inc is a Canadian microwave technology company founded in 1986.

CAPABILITY: ITS Electronics Inc has the design, manufacturing, and test capabilities spanning the frequency spectrum from 0.4 to 40 GHz to satisfy the most demanding requirements. Their facility houses microwave design and test laboratories, substrate etching facility, controlled environment manufacturing facility, a CNC-equipped machine shop, and administrative and sales offices. Their industrial quality control system is being established in accordance with the latest edition of AQAP-1. It is being maintained to control management, design, procurement, fabrication, assembly, test, and inspection.

ITS Electronics Inc draws its strength from the in-depth knowledge and understanding of the technologies critical to the application of RF, microwave, and millimeter wave systems.

AVERAGE WORK FORCE: PhD - 2
Engs - 4
Others - 6

GROSS SALES: No data.

PLANT SIZE: 4122 sq ft

EQUIPMENT: Complete microwave component and subsystem design and manufacturing facility including full HMIC capability. In-house computer systems equipped with the latest in microwave and mechanical CAD software.

EXPERIENCE: The company's RF and microwave-based systems are used by both commercial and defense establishments in Canada, Europe, and the US. Their customers include Leigh Instruments Ltd, Ontario Hydro, Telesat Canada, Canadian Astronautics Ltd, Northern Telecom, Com Dev Ltd, Mel Dsl Ltd, British Aerospace, Valmet, Maclean Hunter Cable, Canadian Broadcasting Corporation, Amtech Technology Corporation, Sciex Inc, Iris Systems Ltd, Williams Communications

Services Ltd, Department of National Defence, General Electric-Flessy Telecom, Wavemat Inc, Comlink Inc, and Anorad Inc.

REVISED: Apr 90

ITT CANNON CANADA (A Division of ITT Industries of Canada Ltd)

ADDRESS: 4 Cannon Court
Whitby, Ontario
Canada L1N 5V8

CONTACT: Mr R W Small, Manager of Marketing and Sales
Tel: (416) 668-8881
Fax: (416) 668-4152

KEYWORDS: Cables; Connectors; Harnesses; High Pressure (Connectors); High Temperature & Firewall (Connectors); Glass-to-Metal Hermetic Connectors; Materials R&D (Connectors); Testing (High Pressure); Wiring.

HISTORY: The company commenced operation in Canada in 1942 as Cannon Electric Company Ltd. The parent company, Cannon Electric Company (Los Angeles), was eventually purchased by ITT Corporation, and the Canadian company became a wholly owned ITT subsidiary. In 1956, the company name was changed to its present name, and in 1967 the company began operation as a division of ITT Canada Ltd. The company maintains sales offices in Montreal, Ottawa, and Vancouver.

CAPABILITY ITT Cannon Canada is engaged in R&D, manufacture, and sales of electrical & electric connectors, cable harnesses, and interconnect devices for the hostile environment market. Cannon connectors are in virtually every passenger jet aircraft in the free world, deep in the earth and ocean, in space, in nuclear reactors, and in oil and gas drilling rigs - in other words, in the hostile environment.

Their manufacturing capability features both manufacturing and industrial engineering, tool design (plastic & metallic components), machining fabrication and assembly operations, machine and model shops, molding facilities, and electroplating. They have worldwide market responsibility and engineering design cognizance over (a) battery power connectors, (b) firewall connectors, (c) waterproof connectors, (d) high-temperature connectors, (e) buffet series, (f) aircraft firewall connectors, (g) circular nuclear series, (h) weatherproof series, (i) Canadian design specials, (j) environmental rack & panel DRA series, (k) geophysical-seismic, (l) cryogenic connector series, (m) sonar-underwater tow connectors, and (n) glass-to-metal hermetically sealed connectors.

Product development has led to a variety of new and/or improved connectors. These include (a) a new series with proven results at elevated temperatures for nuclear applications; (b) a connector to meet MIL-C-28840 for seaboard applications (QPL); (c) a connector (MS5015/3400D series) being used by the US Navy on new equipment as well as for retrofit, replacement, and all power applications; (d) the MIL-C-83723 series III connector designed for high performance aero applications; (e) the "Downhole" connector designed for high pressure usage (hermetically sealed); (f) the MR series connector - rugged, heavy duty, and waterproof (designed to withstand severe environmental conditions); (g) a geophysical hermaphroditic connector designed for the seismic exploration industry; and (h) a connector to meet MIL-C-38999, III K.

AVERAGE WORK FORCE: 220

GROSS SALES: 1988 - \$22M
1989 - \$24M

PLANT SIZE: Production: 55,000 sq ft
Office - 15,000 sq ft

EXPERIENCE: Cannon connectors are designed to the specification of the electronic industry, and meet the requirements of the Canadian Department of National Defence, the US DOD, Canadian Ministry of Transport, and the Canadian Standards Association. Cannon plugs are used worldwide.

REVISED: Mar 90

J J CHARLTON COMPANY Ltd

ADDRESS: 115 Milvan Drive
Weston, Ontario
Canada M9L 1Z8

CONTACT: Mr. John A Charlton, President
Tel: (416) 741-9030
Fax: (416) 741-9004

KEYWORDS: Automatic Screw Machining; CNC Machining; Centerless Grinding; Honing; Induction Hardening; Light Assembly; Machining; Precision Machining, Swiss Type Screw Machining.

HISTORY: J J Charlton Company Ltd is a wholly-owned Canadian company founded in 1947 with a sole affiliate - C.F.N. Precision Machining Inc. J J Charlton initially did work for A.V. Roe (Aircraft Division) during the 1950s. Over the years, J J Charlton has concentrated its efforts on supplying precision machined parts to the aerospace, defense, atomic energy, telecommunications and business systems industries.

CAPABILITY: J J Charlton specializes in precision machining of all alloys and plastics, using single spindle screw machines, Swiss Type Sliding Head Screw machines, and CNC turning and milling machines. They also have a unique Diamond Centerless Grinding capability for fragile material, i.e., ceramic, glass and ferrite tubes. J J Charlton also incorporates a modern CCC department using a computerized statistical CCC system for process capability along with a digital co-ordinate measuring machine. Our CCC manual meets the requirements of AQAP-4, AQAP-6, MIL-I-45208, mil-c-45662A, and CSA Z299-2.

AVERAGE WORK FORCE: Machinists - 37
Quality Control - 4
Production Control - 3
Administrative - 7

GROSS SALES: 1988 - \$3.2M
1989 - \$3.9M

PLANT SIZE: 21,000 sq ft

EXPERIENCE J J Charlton's customers include Devtek (Diemaco), Murata Erie North America Ltd, Kyocera International, Garrett Manufacturing Ltd, Ernst Leitz Canada Ltd, Varian Canada Inc, Leigh Instruments Ltd, Litton Industries, Hughes Aircraft, Martin Marietta, Bell Helicopter, Scott Aviation, Canadian Marconi, Irvin Industries, Spar, ITT Canon, IBM, Xerox, NCR, Vac-Aero International Inc, Amphenol-Bendix, AMP of Canada Ltd and many more aerospace-related customers

REVISED: Mar 90

JADE SIMULATIONS INTERNATIONAL Corp

ADDRESS: #80, 1833 Crowchild Trail NW
Calgary, Alberta
Canada T2M 4S7

CONTACT: Mr Greg Kletke, Vice President, Corporate Development
Tel: (403) 282-5711
Fax: (403) 289-6876

KEYWORDS: Simulation Software Products; Software Development, C3 Systems; ATC System Design; Electronic Systems Design, Telecommunications Systems Design, Electronic Computer Aided Design, Computer Aided Software Engineering.

HISTORY: Founded in 1983 as UHA Ltd, the company changed its name to Jade Simulations International Corporation in December 1987. Since 1987 the company has been focussed on the development and marketing of a high performance simulation software language. The company has a US subsidiary, Jade Simulations Corporation, in McLean, Virginia.

CAPABILITY: Jade is in the business of delivering high-performance computer simulation solutions to customers in the military, telecommunications, air transportation, and electronic design markets. The company markets a simulation platform (hardware and software) as well as appli-

cation level software development. Systems currently being simulated with Jade's products include naval communications systems, telecommunications networks, war gaming systems, and electronic computing.

AVERAGE WORK FORCE: PhD - 4
Software Engs - 11
Others - 8

GROSS SALES: 1989 - \$0.8M
1990 - \$1.2M

PLANT SIZE: 6,000 sq ft

EQUIPMENT. The company's equipment includes a 650 Mip Meiko Parallel Supercomputer, a network of 15 Sun Microsystems workstations, and a network of 14 Apple personal computers with full desk top publishing capabilities.

EXPERIENCE The company's customers include Canadian Department of National Defence, Naval Research Laboratories, Washington, DC, Alberta Government Telephones, BBN Communications, Apple Computers; and General Electric.

REVISED: Mar 90

KAYCOM Inc

ADDRESS: 5800 Thiemens Blvd
Vile St Laurent, Quebec
Canada H4S 1S5

CONTACT: Mr Brian March, President
Tel: (514) 745-5000
Fax: (514) 336-5810

KEYWORDS: Airframe Spares; Logistic Support; Spare Parts (Aircraft); R&O (Parts); Spare Parts (Engines).

HISTORY: Kaycom Inc is primarily involved in the supply, and manufacturing and overhaul of military replacement parts and equipment. Since its inception, Kaycom has specialized in the logistic support of a wide variety of North American designed military transport and fighter aircraft.

CAPABILITIES: Kaycom possesses an extensive product list for which they have developed excellent sources of supply for current and out-of-production aircraft. The company products range from electronic to mechanical, and include airframe and engine spares, to total support all military type equipment.

AVERAGE WORK FORCE: Engineers - 1
Management - 4
QA - 2
Sales - 2
Others - 6

GROSS SALES: 1988 - \$4.8M
1989 - \$5.2M

PLANT SIZE: 15,000 sq ft (including warehouse)

EXPERIENCE: Present customers include DND; commercial and research agencies (i.e., Canadian Coast Guard and National Research Councils); foreign military based establishments (i.e., Namsa and Ministry of Transport, Britain), and Canadian aerospace manufacturers (i.e., Spar Aerospace, Heroux, IMP Aerospace, and many others).

REVISED: Mar 90

KOM Inc

ADDRESS: 145 Spruce Street
Ottawa, Ontario
Canada K1R 6P1

CONTACT: Mr Bill Hopkins, Director, Sales
Tel: (613) 238-7766
Fax: (613) 238-4621

KEYWORDS. Optical Disk, Optical Storage Archive, Mass Storage, Disk Emulation, Jukebox, Autochanger, SCSI Host Adaptor, UNIX Optical Disk.

HISTORY. KOM Inc, originally known as K O Mair Associates Ltd, was established as a proprietorship in 1969 in Ottawa, Canada. The firm provided expertise in service and maintenance of computer and peripheral equipment, particularly for Digital equipment. To date, service to equipment is provided on a regional level. In 1978, the company diversified into manufacturing its own computer products. In 1986, KOM developed its worm (write once read many) technology.

CAPABILITY. KOM specializes in the integration of worm optical disks into the general computing environment. Specific features of this integration are (1) support of random access to the same disk directory structure, and (2) support of the identical file attributes as the host computer operating system. These ensure that no modifications are necessary to the applications or host operating system. Current support is for DEC VAX and PDP11 computers and SUN/UNIX systems. This support will be extended to other significant computer types during 1990-1992.

AVERAGE WORK FORCE: PhDs - 2
Engineers - 4
Others - 24

GROSS SALES: 1988 - \$3.6M
1989 - \$2.6M

PLANT SIZE: 8,500 sq ft

EQUIPMENT. DEC VAX 11/780, Micro VAX (3), CAD workstation (3), flow soldering and board stuffing, temperature cycling and other electronic test facilities, and optical disk drives (LMS/OSI, Optimum, Alcatel Thompson, Sony, Mitsubishi, Pioneer, Kodak, and others).

EXPERIENCE. KOM was recently awarded a contract to integrate optical disks for the storage of mechanical drawings on all US Navy ships. Other significant contracts for optical disk storage from E I Dupont, General Electric Aerospace (Utica, NY), Grumman Aerospace (Long Island, NY), Norwegian Army, European Space Agency, Texas Instruments (Dallas, TX), Shell Oil (Houston, TX), NASA, and GTE.

REVISED: Mar 90

KOSS MACHINE & TOOL CO

ADDRESS: Unit 28
173 Advance Blvd
Brampton, Ontario
Canada L6T 2Z7

CONTACT: Mr Dragomir Cajic, President
Tel: (416) 458-5030

KEYWORDS. CNC Machining, Injection Molding Tools, Machining, Precision Machining; Tooling; CAD/CAM Services.

HISTORY. Koss Machine & Tool Co was started in 1975 as a general machine shop and incorporated in 1976. The company ventured into defense and aircraft industry associated work in 1978 which today comprises 80% of their work. The company is a division of 333 111 Ontario Ltd.

CAPABILITY. Koss Machine is involved in milling and lathe operations primarily involved with defense and aerospace related work. A quality assurance manual (quality level to AQAP-4) has been prepared.

AVERAGE WORK FORCE: Machinists - 18
Quality Control - 2
Production Control - 1
Administrative - 4

GROSS SALES: 1988 - \$1.13M
1989 - \$1.45M

PLANT SIZE: 12,000 sq ft

EQUIPMENT: Koss' equipment includes CNC machines, vertical milling machines, engine lathes, turret lathes, and other assorted equipment associated with machining operations. The company has added a CAN/DAM system (Gibbs) to supplement our CNC operations.

The CNC milling operation has a working travel of up to 20x40 inches and a vertical space up to 29.75 inches. Tolerances can be held to 0.0003 inch. A new Makino machine center is operational. It exhibits X, Y, Z axis lengths of 75.5, 27.5, and 23.6 inches, respectively.

Lathe operations are carried out with both CNC and conventional machines with maximum swing of 24 inches, maximum cross travel of 9.75 inches, and a maximum machining length of 21.5 inches.

EXPERIENCE: Contractor approvals have been afforded by Canadair Ltd, Boeing Canada Ltd, and McDonnell Douglas.

REVISED: Mar 90

LANDSOWNE INTEGRATED SYSTEMS Inc

ADDRESS: 1800 275 Slater Street
Ottawa, Ontario
Canada K1P 5H9

CONTACT: Mr J. Faulkner, Director of Sales and Marketing
Tel: (613) 236-3333
Fax: (613) 236-4440

KEYWORDS: Project Management; Proposal Writing; Custom Software; Systems Analysis; Configuration Management; Cost Schedule Control System, Integrated Logistic Support.

HISTORY. Lansdowne Integrated Systems Inc is a Canadian-owned, high technology service company founded in 1976. It was originally owned by its founder, Mr M B Darch, and is now controlled by Canadian Shipbuilding & Engineering Ltd of St Catharines, Ontario. It is presently active in the Canadian, the US, and western European markets from its sole operating location in Ottawa, Ontario.

In 1989 in conjunction with the Oil and Gas Construction Group of Aberdeen, Scotland, it formed a subsidiary, Simetra Inc, to obtain the Canadian distribution rights to the project management software product, Artemis.

CAPABILITY: Lansdowne's current work includes the proposal and project management activities for a major military program, including the development and implementation of project management information systems, cost/schedule control systems, and configuration management systems which meet MIL-SPEC requirements. This work followed on from a myriad of similar Air Force and Army projects successfully completed for both government and industry.

Lansdowne's project and proposal management expertise, combined with its systems analysis and software development skills, has resulted in a number of successful customized software programs related to management control, inventory control, vendor evaluations and management, integrated logistics support analysis, and information management.

Lansdowne's subsidiary, Simetra Inc, has provided and is supporting the use of the Artemis project management software by a number of organizations, including a major Canadian aircraft management company in the development of an entirely new aircraft.

AVERAGE WORK FORCE: Advance Degrees - 10
Degrees - 22
Others - 8

GROSS SALES: 1988 - \$1.0M
1989 - \$1.7M

PLANT SIZE: 10,000 sq ft

EQUIPMENT. Lansdowne owns and operates IBM compatible, DOS- and UNIX-based computer systems. Software tools currently in use include ZIM, ORACLE, Artemis, DEVELOPER and MODUS.

EXPERIENCE: Present and recent customers include the Canadian Department of National Defence, Health and Welfare Canada, Correctional Services Canada, Canadian Shipbuilding & Engineering Ltd, Canadair Ltd, Vulcan Equipment Company Ltd, and Canadian Kenworth Company.

REVISED: Mar 90

THE LASER INSTITUTE

ADDRESS: 9924 - 45th Avenue
Edmonton, Alberta
Canada T6E 5J1

CONTACT: Dr V E Merchant, Program Director
Tel: (403) 436-9750
Fax: (403) 437-1240

KEYWORDS: Lasers; Precision Parts; Welding; Heat Treating; Weld Overlaying; Cladding; Cutting; Sensors; Inspection; Corrosion Control; Optical Systems; Quality Assurance Instrumentation; Measurement; Machine Vision, Catalysis, Ceramic Technology.

HISTORY. The Laser Institute was founded in 1984 as a wholly-owned subsidiary of the University of Alberta in Edmonton. The mandate of the institute is to encourage the use of lasers in Alberta and Western Canadian industry.

CAPABILITY. The Laser Institute offers a variety of material processing including laser cutting, welding, heat treating and weld overlaying. The institute also offers a wide spectrum of services in research, development, and engineering of laser applications and systems. Services include process and procedure development, testing, feasibility studies, and business planning. The institute specializes in four areas: laser materials processing, sensors, metrology, and machine vision.

AVERAGE WORK FORCE. Phds - 4
Engineers - 5
Others - 6

GROSS SALES: FY 1988 - \$225K

PLANT SIZE: 10,000 sq ft

EQUIPMENT. Equipment includes 5000 watt CO2 laser with 5-axis CNC work station, 1000 watt CO2 laser with 2-axis CNC work station, computer aided design work station, Zimmer 600/10 laser proximeter based surface profiler, Imaging Technology 151 image processor/machine vision system, vacuum leak detector, fiber optic power meter, high resolution OTDR with photon counter, fully equipped optics lab for visible and IR work.

EXPERIENCE. The Laser Institute has been involved in.

- Laser cutting a variety of materials.
- Applying corrosion-resistant coatings for a variety of manufacturers of oil field equipment.
- Feasibility study and consulting for a variety of manufacturing industries investigating the use of materials processing lasers in their operations (e.g., heat treating of mining plates, laser fusing of both electroplated and plasma sprayed coatings, welding of hot dipped galvanized steel, cutting woven metal screens).
- Design, construction, and evaluation of X-ray preionized laser system.
- Study of weld pool dynamics in low-gravity, zero-atmosphere environment.
- Feasibility study of automated pipe throat inspection.

- Proof of principle study of laser technology to detect illicit materials in luggage.

- Design and prototype construction of automotive frame alignment system.

- Design of specialized optical densitometer for hydrocarbon research.

- Study of laser card drive technology.

REVISED: Mar 90

LAVALIN Inc/LAVALIN DEFENCE Inc

ADDRESS: Suite 500, Tower B
Place de Ville
112 Kent Street
Ottawa, Ontario
Canada K1P 5P2

CONTACT: Mr Edward Billo, Vice President, Defence Projects
Tel: (613) 232-3511
Fax: (613) 235-8390

KEYWORDS. Process Control, Network Management, Computer-Aided Design; Microcomputers; Digital Graphics; Computer-Aided Teaching; Office Automation, Remote Sensing, Military Trucks, All Terrain Crash Recovery Vehicles, System Integration, Quality Assurance, Secure Office & Communications Systems, Project Management.

HISTORY: Lavalin Inc is a wholly-owned Canadian Corporation engaged in engineering, manufacturing, procurement, construction management, and project management. It was founded in 1936 with a head office in Montreal and offices across Canada and in several countries around the world. It has completed projects including turnkey projects in more than ninety countries worldwide.

CAPABILITY. The Lavalin Group is involved in studies, planning, engineering, procurement, project management, construction, manufacturing, training, and technical assistance in military, government, and industrial projects. It draws resources from approximately eighty-five group divisions and associate companies offering technology in aerospace and air transportation, both military and civil. Two of these divisions are Lavalin Aviation and UTDC Inc.

Lavalin Aviation offers an integrated line of services regarding operations, technical assistance, and expertise related to commercial air transport, passenger, and cargo services at national and international levels, engineering and maintenance of equipment with facilities located at the Montreal International Airport (Dorval) capable of handling stretch aircraft and including an avionics overhaul and repair shop, technical supervision and project management services, specialized qualifications courses, and technical training, civil aviation administration including administration systems, air traffic control services, airports, and air navigation aids; the Helicopter Division offers complete services in the rotorcraft sector including operations, technical assistance, training, procurement, and sale/purchase services.

UTDC, the other Lavalin division, is a leading supplier of ground transportation systems and ground handling equipment and services. In addition to transportation systems research and development, UTDC offers complete services for the development, training, operation, and maintenance of efficient revenue services on behalf of the clients. UTDC designs and manufactures light rapid transit as well as conventional and articulated light rail, heavy rail, and computer rail transit systems. It is currently engaged in the supply of heavy military trucks for the Canadian Armed Forces and is bidding on a large USAF requirement for aircraft cargo loaders.

AVERAGE WORK FORCE: Engineers & Other Professionals - 2,500
Technicians - 1,500
Others - 2,000

GROSS SALES: 1989 - \$550M

PLANT SIZE: 170,000 Sq Ft (UTDC)
65,000 Sq Ft (Lavalin Aviation)

EQUIPMENT: UTDC can provide complete developing, testing, research and development programs, engineering and design, and manufacturing capabilities. Facilities are located in Thunder Bay and Kingston, Ontario. In-house computer systems include mainframe VAX and DEC system, CAD facilities, IBM, Aries II computer system, and PDP central processing units.

EXPERIENCE: Present customers include various departments within the Canadian Government and industries in both Canada and the US:

- Department of National Defence - Heavy Logistics Vehicle Wheeled System (\$250M Cdn), Life Skills Education Program, design, development, and presentation of an advanced avionics course.
- Oerlikon Aerospace - Construction radar manufacturing plant, St-Jean, Quebec.
- UTDC - Heavy rail mass transit (\$58M US), Massachusetts, articulated light rail vehicles (\$52.2M US), Santa Clara, California, bi-level locomotive hauled commuter coaches (\$24M US), State of Florida; downtown people mover turnkey contract (\$167M US), Detroit, Michigan.

REVISED: Apr 90

LEAVENS AVIATION Inc

ADDRESS: 2555 Derry Road East
Mississauga, Ontario
Canada L4T 1A1

CONTACT: Mr E Baumgartner, Production Manager
Tel: (416) 678-1234
Fax: (416) 678-7028

KEYWORDS: Aircraft Parts; CNC Machining; Control Cables (Aircraft); Hydraulic Hose; Machining; R&O (Accessories); R&O (Engines); R&O (Propellers).

HISTORY: Leavens Aviation Inc is a Canadian-owned company founded in 1927. In its early days, it was primarily engaged in air transportation and flight training. During the second World War, in addition to operating a flight training school for Commonwealth pilots, it enlarged its engine, propeller and accessories overhaul capabilities, and engaged in manufacturing parts and assemblies for aircraft.

In 1972, the operation was relocated to its present facility, concentrating on manufacturing of aircraft parts and assemblies, distribution of aircraft supplies, as well as the overhaul of engines, propellers and accessories for small-to-medium-sized aircraft.

CAPABILITY: Leavens Aviation Inc specializes in the manufacturing of parts, sub-assemblies and assemblies for military and civilian aircraft, and the overhaul of piston engines, propellers and accessories.

AVERAGE WORK FORCE: 50

GROSS SALES: 1988 - \$6.3M
1987 - \$6.4M

PLANT SIZE: 30,000 sq ft

EQUIPMENT: Equipment includes CNC milling and turning, full machining capabilities, and assembly and test facilities.

EXPERIENCE: Leavens Aviation Inc has manufactured parts and assemblies for Canadian and US manufacturers. They provide their customers with hydraulic hose and aircraft control cable assembly and test facilities, and overhaul of aircraft engines, propellers, and accessories. They are interested in doing business for the USAF.

REVISED: Mar 90

LEBLANC & ROYLE TELCOM Inc

ADDRESS: 514 Chartwell Road
PO Box 880
Oakville, Ontario
Canada L6J 5C5

CONTACT: Mr Manfred Muenzel, Management Sales and Marketing
Tel: (416) 844-1242
Fax: (416) 844-8837

KEYWORDS: Communications Towers, Beacon Antennas, HF Antennas, R&O (Antenna Structures), Axial Cable, Microwave Antennas & Waveguide, Site Development, Emergency Restoration Service, RF Testing, Strobe Lighting Systems.

HISTORY: LeBlanc & Royle Telcom Inc is a closely held, private company, founded in 1962 by Federal Charter. Originally, a light communications tower manufacturer and installer, LeBlanc has become a major tower contractor having designed and supplied antenna support structures of over 2000' and completed large, turnkey projects. We have expanded our horizons to include manufacturing plants in Sioux City, Iowa; Perth, Australia, and Singapore.

CAPABILITY: LeBlanc & Royle Telcom Inc is primarily engaged in the design, supply, and installation of antenna support and radiating towers as well as turnkey site development. Through the RF Technical Services Division, the company is able not only to install, but also to test antenna systems. The engineering department maintains files on supplied towers and can perform structural analyses in the event loads are altered. In addition to the above, LeBlanc is a distributor for the following:

Cablewave Systems Inc - Coaxial cables, waveguide, and microwave antennas
TCI - HF antenna Systems
Celwave - Land mobile, marine and cellular antennas, combiners, and multicouplers
The Will-Burt Co - Telescopic Pneumatic masts
Lightning Master Corp - Static dissipation arrays

AVERAGE WORK FORCE: Engs - 10
Others - 250

GROSS SALES: No data.

PLANT SIZE: 57,000 sq ft

EQUIPMENT: HP CAD system, HP computer system, steel fabricating equipment, paint shop, HP network and spectrum analyzers.

EXPERIENCE: Present customers include Department of National Defence, Ontario Provincial Police, Canadian Broadcasting Corporation, Roger's Cantel Inc, Bell Cellular, Novatel, and Raytheon.

REVISED: Mar 90

LHOTELLIER CANADA INDUSTRIES Inc

ADDRESS: 700, Montrichard
Iberville, Quebec
Canada J2X 5G4

CONTACT: Mr Iain Boyd, Business Development Director
Tel: (514) 358-4376
Fax: (514) 346-2359

KEYWORDS: Containers; Cases; Packaging; Shelters; Composites.

HISTORY: Lhotellier Canada Industries Inc (LCI) was created in 1986 and is a subsidiary of the Lhotellier Group who have almost 50 years experience in the specialized field of packaging and containerization for the aerospace industry. The group has developed other services and products around this core activity such as shelters and composites and today employs over 1400 people.

CAPABILITY. LCI markets all of the Lhotelier group products in North America and has developed standard container ranges specific to North American requirements.

LCI has the ability to manage all phases of a program, design, development, qualification, and production for a complicated container system capable of protecting sophisticated hardware such as satellites or missiles.

LCI can offer to its customer base today's advantages of being part of an international group operating in the aerospace environment.

AVERAGE WORK FORCE. Engineers/technical - 7
Shop personnel - 15
Administration - 12

GROSS SALES: 1988 - \$1.4M
1989 - \$2.5M

PLANT SIZE: 20,000 sq ft

EQUIPMENT. Specialized machinery for the production of container foam interiors. NC machine for the marking of metal identification plates.

EXPERIENCE. The company's customers include Department of National Defence (Canada), Bendix Avielx Inc, Spar Aerospace Ltd, Bombardier (Canadair Division), Oerlikon Aerospace Inc, Garrett, and Pratt and Whitney.

REVISED: Mar 90

LITTON SYSTEMS CANADA Ltd

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Etobicoke, Ontario
Canada M9W 5A7

CONTACT: Mr D Hughes, Director of Marketing
Tel: (416) 249-1231
Fax: (416) 246-2955

KEYWORDS. ATC, ATC Simulators, Avionics, Build To-Print, Cathode Ray Tube Displays, Cockpit Displays, Data Acquisition, Data Analysis, Flat Panel Displays, Inertial Navigation, Instruments, Intrusion Detection, LED Displays, Liquid Crystal Displays, Navigation, R&O (Avionics), Radar, Search Radar, Ring Laser Gyros, Simulators, Solid State Devices; Subcontract Manufacturing; Training.

HISTORY Litton Systems Canada Ltd (LSL), a major operating division of Litton Industries, has a long and successful history of designing and manufacturing highly sophisticated electronics equipment for military and commercial use in a worldwide market. LSL was launched 30 years ago with a contract to assemble and test the guidance and control systems in the LN3 Inertial Navigation System (INS) for the Canadian Forces CF-104 Starfighter. LSL's facilities were rapidly expanded and improved, and test facilities were established to support the manufacture of gyroscopes, accelerometers, and inertial platforms. The original INS has subsequently been modified and improved, and at LSL, a whole family of guidance systems has evolved to support the European Starfighter program and for use in aircraft manufactured by Grumman, Lockheed, Canadair, deHavilland, McDonnell, and General Dynamics. A Litton guidance system, the LN35, was the one chosen for the US Cruise Missile.

CAPABILITY LSL has become a dominant force in the INS marketplace, providing both spinning wheel and ring laser gyros for the military and commercial marketplace. The LTN 72 system has achieved phenomenal success and is the most widely used INS throughout the world. The LTN-72 is a reliable, self-contained, all-weather, worldwide navigation system that is totally independent of ground based navigation aids. In 1982, LSL underwent a major expansion and upgrading of its INS capabilities to allow the manufacture of ring laser gyro-based inertial systems. Litton Canada has a world product mandate to build commercial RLGs for Litton Industries. These systems, the LTN 90, LTN 90 100, and the LTN-92, are now on board aircraft such as the A310, A300-600, P-3C, C-130, E 6A, Dash 7 and 8, and The Challenger 601.

Utilizing the wealth of experience acquired in LN3 INS design and production testing, in 1962 LSL developed a punched-tape programmer-controlled mobile automated test set for first-level maintenance support of the INS used on board F-104 and P-3 aircraft. LSL developed its first computer-controlled automatic test equipment (ATE) in the late 1960s. This system, the Litton Automated Test Set (LATS), is utilized by LSL as factory test equipment, as well as by a number of commercial and military customers as depot test stations. The LATS has been expanded to accommodate the testing requirements of the F-18 and other modern aircraft and helicopters. The expanded Litton Automated Test Set (ELATS) is used as a depot test station in support of new aircraft programs. ELATS and RF ELATS (for testing RF systems) has been purchased by the Canadian Air Force, the Royal Australian Air Force, the Royal Australian Navy, and one European NATO Air Force.

In June 1967, the company began broadening the scope of the projects it pursued and competed for and won the contract for the supply of CCS-280 command and control system for the Canadian DDH-280 class destroyers.

Twenty-one years later, LSL headed up a team of Canadian industrial firms to reconstruct Canada's four Tribal class destroyers. The Tribal Update and Modernization Project (TRUMP) has seen LSL chosen as the prime contractor in the refurbishment of the four ships the company help build. The first destroyer entered dry dock in the fall of 1987 on schedule. Litton Canada is now one of the largest marine systems houses in Canada.

LSL's expertise in the marine environment includes the Automatic Data Link Plotting System (ADLIPS). ADLIPS is a complex, low-cost, shipborne computer-assisted, real-time command, control, and tactical data communications system which can be fully integrated with existing ships' systems.

Previous in-depth experience in the development of software in both the inertial and systems engineering fields made LSL the logical choice for the contract to develop the Data Interpretation and Analysis Center (DIAC) for the Maritime Command of the Canadian Forces. The DIAC correlates current and historical data enhancing mission planning and control.

The expertise acquired in systems engineering was also responsible for the design and development of Litton Integrated Security Systems. These computer-based systems combine complete perimeter detection, surveillance, access control, and radio communication to provide the necessary level of protection. The company has obtained contracts for the system for implementation at a Middle East air force base. Canada systems have been installed in maximum security penitentiaries and nuclear power generating stations.

In order to ensure that its products and areas of expertise stay abreast of the current technology, LSL is committed to a high investment in research and development. This effort, combined with assistance from a joint Canadian/US development contract, resulted in the development of a solid-state, multi-colored modular, flat panel display system using light emitting diode technology for use in the military and commercial environments. This system has been selected by General Dynamics for implementation in the F-16 aircraft, by Boeing for use on the EC-135, and by a number of simulator manufacturing companies.

The company has also embarked upon a major R&D program to establish other new technologies appropriate to the cockpit display requirements of the next generation of advanced military and commercial aircraft, scheduled for production in the mid-90s.

Another successful R&D program that has also progressed to production is the Inertial Referenced Flight Inspection System (IRFIS). IRFIS is a self-contained en route and terminal navaid calibration system. It performs calibration of Category I, II, and III instrument landing systems with higher accuracy and lower operating costs than other systems currently in use.

Another example of the successful implementation of R&D and systems engineering is the Litton family of Airborne Search Radar Systems. LSL entered the field in 1972 when it developed radar systems for fleet fitment in the Canadian Forces CH-124 Sea King Helicopters. Since that time, a number of different systems have emerged with varying capabilities. The Litton radar is currently flying on 16 different types of aircraft in 18 countries around the world. The company is also building X band

radar for the Canadian LLADs and the US FAD-LOS programs. In the summer of 1988, the company established a radar manufacturing facility in Halifax, Nova Scotia to produce these radars and to support the CP-140 aircraft.

LSL has recognized that an electronic system management capability is a national priority, and has taken the necessary steps to equip the company with the organizational structure, skilled management, technical personnel, and specialized computer facilities to undertake the management of large, complex, electronic and avionic programs.

AVERAGE WORK FORCE: Engineers - 800
Mfg/Admin/Techs - 2,200

GROSS SALES: 1988 - \$508M
1989 - \$581M

PLANT SIZE: 700,000 sq ft

EQUIPMENT: LSL is fully equipped to perform R&D, production, and extensive test and evaluation in all areas discussed above. Their electronic and electromechanical laboratories, which are in a controlled environment, are amply equipped with the most modern test and development equipment including a VAX VT100 and other digital computers.

EXPERIENCE: See discussion above under "Capability."

REVISED: Mar 90

LNS SYSTEMS Inc

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Pointe-Claire, Quebec, Canada
H9R 4W3

(Airspace Automation Division)
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Canada K1B 3V7

CONTACT: Mr George Sinoyannis, Executive Vice President
Tel: (514) 695-8130
Fax: (514) 695-8135

(Airspace Automation Division)
Mr Robert A Jones, Manager
Tel: (613) 747-8740
Fax: (613) 747-8746

KEYWORDS: ATC, Towers, Mobile or Fixed, RAPCON, Shelters, R&O, Radio Spectrum Monitoring Systems, Mobile Runway Lighting Systems, Voice Switching Systems, Store & Forward Message Switching, Voice/Data Switches, Satellite Weather Information Distribution, Multipurpose Information Displays, Weather Map Displays, Flight Data Processing, Radar Processing and Display, ATC Simulation (Training).

HISTORY: LNS Systems Inc was originally founded in 1971 as Air Vision Industries. It was acquired by ITP in 1973 when ITP Canada Ltd won the terminal radar and control system contract for the Canadian Department of National Defence. In 1979, the company was bought by Leigh Instruments and renamed Leigh Navigation Systems. In 1982, the company was sold back to senior management as LNS Systems. In 1987, the company acquired METCAN Fabricators Inc of Ottawa and established a cooperative relationship with Oracle Telecomputing of Carleton Place, Ontario, in 1989.

CAPABILITY: LNS Systems is primarily involved in providing air traffic control related systems. These range in scope from two position mobile control towers to the nationwide capability of the TRACS program. The range of technology is from mobile runway lighting systems to radio spectrum monitoring from manually operated voice switches to meteorological information processing and display. Radar processing systems can process and display up to 500 targets with an update rate of 6-12 seconds. Flight data processing systems can handle up to 2000 flight plans with 250 active in any mix of IFR/VFR, jurisdiction handoff and automatic routing change are also provided. Message switches can operate in

AFN, TELEX, and similar networks with up to 192 multi protocol lines at 30,000 messages per hour. Radio spectrum monitoring systems can provide security surveillance and communication monitoring functions in either manual- or computer-controlled configurations. Computer controlled systems can be supplied in fault tolerant dual processor configurations. Fabrication methods meet or exceed AQAP4.

Software design and implementation is in accordance with DOD-STD 2167A using Ada as the PDL. LNS provides consulting, program management, hardware and software design and development, product assurance (including reliability and maintainability analysis), production (including R&O), quality assurance, documentation, and training.

AVERAGE WORK FORCE: Engineers - 19
Technologists - 8
Production - 20
Administration - 27

GROSS SALES: Airspace Automation Division
1988 - \$4.1M
1989 - \$3.9M

PLANT SIZE: 60,000 sq ft

EQUIPMENT: No data.

EXPERIENCE: Customers include US Navy, FAA, DND Canada, and Transport Canada. Sales to other countries have included Algeria, Saudi Arabia; Kuwait, Barbados, Uganda, Brazil, Libya, Taiwan, and China.

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LOCKHEED CANADA Inc

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Canada K1B 4L5

CONTACT: Mr Fred Bertelmann, Director Business Development
Tel: (613) 738-4514
Fax: (613) 738-4510

KEYWORDS: R&O (Avionics); Electronic Warfare; Circuit Card Assembly; Power Supplies; Harnesses; TPS Development.

HISTORY: The new Lockheed Canada came into effect on the 25th of December 1988. The Company was formed through the amalgamation of the existing Lockheed Canada, primarily a marketing office, with Sanders Canada (SCI), a subsidiary of Sanders Associates Inc. of Nashua, New Hampshire. The original SCI was established in 1985 in response to the Industrial Benefits clause of the Canadian Forces AN/ALQ-126B contract to provide Canadian EW support, and the capability to design, test, and produce EW products. As prime contractor, Lockheed Canada has proven its capabilities and dedication to excellence by being awarded Phase I of the Electronic Support and Training (EST) Project. This \$90 million project will provide airborne EW training assets to the Canadian Forces.

CAPABILITY: Lockheed Canada's capability includes

- Engineering. Current engineering activities include EW technique studies, EEPROM update for the AN/ALQ-126B systems, development of the Portable Universal Programming System (PUPS) and standard air vehicle equipment/bus controller and structural computer, development of an AN/ALQ-126B test program set (TPS) for an automatic test station, EW software support for the CF-18 aircraft EW systems, and support for the CP-140 Aurora OL-5004 AYS Acoustic Data Processor (ADP). Engineering and product support services are also provided for all of Sanders Associates' products manufactured for Canadian defence requirements. Lockheed Canada has a resident DND QA Inspector.

- Repair and Overhaul. Lockheed Canada also has a repair and overhaul (R&O) facility in a secure area with special access control for the maintenance support of the CP-140 OL-5004AYS and

the CF-18 AN/ALQ-126B ECM Systems, and the AN/USM 406C(V) flight line test set.

• **Manufacturing:** Lockheed Canada's manufacturing capabilities include complex electronic cable and harness assembly, printed wiring board assembly, power supply, and subsystem assembly. The majority of our manufacturing programs are for military applications, and at present, a large percentage of this work is exported to the United States. We have achieved an AQAP-1 (MIL-9858A) level of quality standard and the company has implemented a formal program to comply with the new US Navy Weapons Specifications WS-6535 and DOD-STD-2000.

The facility is cleared to SECRET and the company operates a large TEMPEST facility and has extensive EW simulation and modeling capabilities.

AVERAGE WORK FORCE: PhD - 2
Engineers - 15
Others - 135

GROSS SALES: 1988 - \$14.0M US
1989 - \$11.9M US

PLANT SIZE: 60,000 sq ft

EQUIPMENT:

- In-house computing equipment including a VAX 11/785 and a Micro-VAX II computer.
- Complete production equipment for power supply, circuit card, and wire harness assembly and test.
- Depot level support equipment including CF-18 EW support equipment (power supply fill group, power supply assembly and subassembly test stands, USM 392 analog/digital test stand, microwave test station and temperature chambers), and CP-140 acoustic data processor support equipment comprising 11 test stations (e.g., analog, digital, power supply, circuit card assemblies, WRA).

EXPERIENCE: Government and commercial customers primarily in Canada and the US.

REVISED: Mar 90

LUCAS AEROSPACE INC (Control Systems Division)

ADDRESS: 5595 Royalmount Avenue
Montreal, Quebec
Canada H4P 1J9

CONTACT: Mr S R (Russ) Woodland, Vice President and General Manager
Tel: (514) 735-1536
Fax: (514) 342-2047

KEYWORDS: AOG Service, R&O (Accessories), Mechanical Fuel System, Hydraulic Systems, Specialized Controls.

HISTORY: Operating since 1949, Lucas Aerospace Inc Control Systems Division is a division of Lucas Aerospace Inc, located in Reston, Virginia. The company provides a fully integrated facility for design, engineering, manufacturing, assembly, testing, and customer service for a wide range of aerospace products supplied primarily to the North American market.

CAPABILITY: The Canadian company has designed and developed a range of ancillary fuel controls, starting flow controls, flow dividers, dump valves, collector tanks, and ejector pumps for gas turbine engines. Production of main fuel pumps for PW 100 series engines under license commenced in 1985. An extensive capability exists for repair and overhaul of a wide range of equipment including fuel pumps, hydromechanical fuel controls, generators, regulators, air valves, starters, actuators, relays, ignition, contactors, and industrial accessories.

AVERAGE WORK FORCE: Manufacturing - 85
Engineering - 7
Sales & Marketing - 10
Others - 18

GROSS SALES: 1988 - \$12.0M
1989 - \$15.0M

PLANT SIZE: 54,000 sq ft

EQUIPMENT: Equipment includes.

- Test facilities for the repair and overhaul of both fuel and hydraulic systems, including Rolls Royce Spey and Tay engines and CF-18 F 404 engine. These facilities can accommodate products requiring drives up to 400 hp, with drive speeds of 40,000 rpm, fluid pressures of 5,000 psi dynamic, and flow rates to 60,000 gph.
- For pneumatic products, air test pressures up to 1,000 psi and flow rates up to 2.2 lbs per second are available.
- Electrical AC and DC stands for solid state rotating equipment are similarly comprehensive.
- Manufacturing (example) - Monarch VMC45 CNC with GE 2000 control with contouring travel 18 x 30 x 10 in. Nakamura Tome Model TMC-3B CNC Lathe with Fanuc 6T control. Nakamura Super 2A CNC Lathe with Fanuc 10T-F control. Mori Seiki MV-Junior CNC machining centre with Fanuc 10MA control.
- Inspection (example) Mitutoyo coordinate measuring machine type FN 905. Non-destructive testing equipment.

EXPERIENCE: Present customers include the Canadian Department of National Defence, Boeing, Pratt & Whitney Canada, Canadair, Textron-Lycoming, GE, Rolls Royce Canada, and Boeing of Canada.

REVISED: Mar 90

LUCAS AEROSPACE Inc (Microwave Technologies Division)

ADDRESS: 3135 Universal Drive
Mississauga, Ontario
Canada L4X 2E7

CONTACT: Mr Peter Balodis, Sales and Marketing Manager
Tel: (416) 625-4605
Fax: (416) 625-4274

KEYWORDS: Microwave Components; Switches; PIN Diode Switches; Amplifiers; Microwave Amplifiers; Low Noise Amplifiers; Medium Power Amplifiers; High Power Amplifiers; Electroforming, GaAs FET Amplifiers, Ferrite Devices; Isolators; Circulators; Coaxial Ferrite Devices; Microwave Subassemblies; Waveguide Ferrite Devices; Isodapters.

HISTORY: Lucas Microwave Technologies Division (MTD) has been designing and manufacturing microwave components and subassemblies since it was founded in 1962 as Desitron. In 1977, the business was acquired by M/A COM and was known as MA Electronics Canada. In 1988, they became part of Lucas Aerospace Inc and a member of the Communications and Electronics Division, which includes Lucas Epsco Inc, Lucas Weinschel Inc, and Lucas Zeta Inc. The member companies design and manufacture a wide variety of high-quality RF and microwave components and subsystems for defense and commercial applications. As a part of Lucas Industries plc, we are backed by a company with over \$3.5 billion in sales and more than 56,000 employees worldwide. Lucas Aerospace's North American presence now involves more than 4300 employees with annual sales of more than \$400 million.

CAPABILITY: Lucas MTD is a major supplier of GaAs FET amplifiers and related microwave components for commercial, military, and telecom markets. Their Mississauga facility houses microwave design and test laboratories, an extensive machine shop, and plating and finishing

facilities, complemented by engineering, administrative, and sales offices. They have the capability to provide standard components from a diversified product line, design active and passive devices to customer specifications, and interface requirements and combine technologies into subsystems, thus maximizing overall performance and cost effectiveness. In general, they offer a comprehensive in-house product capability spanning 0.5 to 40 GHz.

Lucas MTD has three product groups:

- Passive Microwave Components – coaxial and waveguide circulators, isolators, and isoladapters and precision electroformed components.
- Commercial Satellite Electronics – low noise communication band amplifiers, solid state power amplifiers, and integrated subsystems containing up and down conversion, filters, multipliers, and sources.
- Hybrid Microwave Integrated Circuit (HMIC) Components – multi-octave wide band amplifiers over .5 to 40 GHz, small signal to 2.5 watts. Manufacturing to MIL-Q-9858A (AQAP-1).

AVERAGE WORK FORCE: 95 (Total)

GROSS SALES: 1988 – \$5.0M
1989 – \$5.0M

PLANT SIZE: 22,000 sq ft

EQUIPMENT: Equipment includes class 10,000 clean room manufacturing area for HMIC products, laser welder for hermetic packages, and electroforming capability.

EXPERIENCE: Lucas MTD's product market is worldwide.

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LUMONICS Inc

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Kanata, Ontario
Canada K2K 1Y3

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KEYWORDS: CO2 Lasers; Cutting (Laser); Drilling (Laser); Dye Lasers; Excimer Lasers; Gas Lasers, Heat Treating; Laser Marking Systems, Laser Materials Processing; Lasers, Pulsed Gas Lasers; TEA Lasers, Welding (Laser).

HISTORY: Lumonics Inc became a Japanese-owned (Sumitomo Heavy Industries, Ltd of Japan), high-technology company effective May 15, 1989. Incorporated in 1970 with three subsidiary companies in the US, Lumonics Corporation provides equipment and services for laser marking and laser materials processing. The company also has a subsidiary in the UK, Lumonics Ltd, that specializes in a range of Nd YAG lasers for industrial machining tasks, and one in West Germany, Lumonics Beteiligungs GmbH, that specializes in industrial CO2 lasers for materials processing. The company was originally formed to manufacture and sell the pulsed CO2 lasers developed at the Defense Research Establishment Valcartier.

CAPABILITY: Lumonics specializes in pulsed gas lasers including excimer, tunable dye, CO2, and HF/DF types. It is the third largest North American laser manufacturer serving both the scientific and industrial markets. They have twelve series of lasers available with various models within each series. A significant portion of their business is contract R&D, but it is carried out only when Lumonics anticipates and retains rights for commercial exploitation. Their scientific market includes university, government, and corporate researchers. The primary fields in which their customers are active are spectroscopy, photo-chemistry, isotope separation, material processing, and plasma research. Lumonics has been manufacturing their excimer lasers for scientific

application since 1978, and introduced the first of an extensive range of industrial applications in 1986. Lumonics' key functions of material procurement and control, electrical and mechanical assembly, and final performance testing are carried out in house. Machined and sheet metal components are subcontracted.

AVERAGE WORK FORCE: Scientists & Engineers – 40 (Canada)
Others – 120 (Canada)
Others – 240 (US)
Others – 180 (UK)

GROSS SALES: 1988 – \$88M
1989 – No data.

PLANT SIZE: 75,000 sq ft (Canada)
150,000 sq ft (US)
75,000 sq ft (UK)

EXPERIENCE: Lumonics has provided the USAF with standard lasers. They have not undertaken any USAF-sponsored R&D. They carry out extensive, in-house R&D for the Canadian Government.

REVISED: Mar 90

MACDONALD DETTWILER AND ASSOCIATES Ltd

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Canada V6V 2J3

CONTACT: Mr F R Hamilton, Vice-President, Corporate Development
Mr Bernie S Clark, Director of Sales
Tel: (604) 278-3411
Fax: (604) 278-2117

KEYWORDS: Data Handling; Ground Stations; Image Processing; Image Recorder; Interactive Analysis; Landsat; SPOT; Laser Film Image Recorder; Meteorological Satellite Processing; Remote Sensing; SAR; Software Systems; Space Qualified Systems; Spot; Synthetic Aperture Radar; Weather Forecasting Systems; Weather Image Processor; ATC; Software Engineering.

HISTORY: MacDonald Dettwiler is a private, Canadian-controlled corporation with two plants in Vancouver, Canada, and sales, service, and engineering offices worldwide.

CAPABILITY: MacDonald Dettwiler is a world leader in computer-based systems for aerospace, resource management, and electronics manufacturing applications. Founded in 1969, the company was launched to success as a major supplier of ground processing systems for the remote-sending Landsat satellites. Today, MacDonald Dettwiler is the world's largest supplier of turnkey remote-sensing satellite ground stations, and has branched out into space-qualified systems; image mapping systems for generating accurate maps from digital images; meteorological data analysis and distribution systems; systems for acquiring, correcting, analyzing, and displaying optical and radar images from both spaceborne and airborne sensors; flight operations management and air traffic control systems; and high-resolution, high speed laser imaging systems for the electronics, manufacturing, graphics reproduction, and remote sensing industries.

The company offers design and development to MIL-SPEC or European Space Agency standards, advanced software engineering techniques, high-reliability and distributed systems, large-scale systems integration, and full integrated logistics support.

Since incorporation, MacDonald Dettwiler has grown to over 650 employees, of whom about 60% have university degrees, mainly in electrical engineering, computer science, and physics. The company counts NASA, the European Space Agency, General Electric's Space Division, the US Jet Propulsion Laboratory, the USAF, and the Canadian Government among its clients. It exports 80% of its products and maintains a network of sales, service, and engineering offices throughout the world.

As a result of its experience and track record, MacDonald Dettwiler is recognized worldwide as the leading supplier of ground receiving and processing systems for remote sensing satellites. The company has been prime contractor for 8 turnkey remote sensing satellite ground stations worldwide and major subcontractor for another 11. These constitute 19 out of the world's 23 Landsat and SPOT ground stations. Full turnkey services, including training and support, were provided for most of these installations. MacDonald Dettwiler is the prime contractor for both the ground segment of the ERS-1 radar satellite and Canada's Radarsat satellite ground station system.

The company is also a leading developer of space-qualified systems and associated artificial intelligence technology. As a major partner in Canada's Mobile Servicing System for the International Space Station Program, the company is contributing towards development of complex software, data processing subsystems, and artificial intelligence applications.

MacDonald Dettwiler's MERIDIAN Image Analysis and Correction Systems combine both geometric and radiometric image correction with an advanced image analysis and processing capability. The MERIDIAN Image Mapping Systems produce topographic and thematic maps from digital imagery sources such as the SPOT and Landsat satellites and airborne synthetic aperture radar (SAR). Their capabilities include geocoded image correction, height extraction, feature detection and extraction, and sophisticated interfaces to digital mapping systems.

The company has also played a leading role supplying meteorological satellite ground systems and components for all commercial weather satellites. MacDonald Dettwiler has been the prime contractor for 14 turnkey weather satellite ground stations. In the broader field of weather data processing and distribution, MacDonald Dettwiler has developed an Automated Weather Distribution System (AWDS) for the USAF. AWDS will eventually provide a global weather information network connecting several thousand mini/micro-computers distributed over 166 sites worldwide.

MacDonald Dettwiler has always been at the forefront of digital synthetic aperture radar (SAR) processing. The company was first to digitally process data from Seasat A satellite, and first to develop a commercial digital SAR processor. It now manufactures a complete airborne SAR system—IRIS—in both remote-sensing and defense versions. The defense IRIS produces three meter resolution imagery and performs both moving and static target imaging in real time, on board the aircraft. Images are downlinked, also in real time, to tactical mobile ground stations and to central processing and analysis facilities.

MacDonald Dettwiler's Aviation Systems Group specializes in developing high-reliability, advanced computer systems for flight operations and air traffic control. Systems and services are provided in airspace management, flight plan filing and validation, flight progress tracking, conflict detection and resolution, aeronautical data communications, simulation and training, radar data processing, flight data processing, and weather data processing.

MacDonald Dettwiler FIRE 240 film image recorders plot high quality monochrome and color satellite images onto film for resource management, and other remote-sensing applications.

AVERAGE WORK FORCE: Elect Eng - 80
Software Eng - 210
Systems Engs - 50
Scientists - 25
Admin - 280
TOTAL - 650

GROSS SALES: 1988 - \$65M
1989 - \$75M

PLANT SIZE: 150,000 sq ft (5 buildings on 2 sites)

EQUIPMENT MacDonald Dettwiler's systems engineering facilities include an extensive VAX- and SUN-based development environment. The hardware manufacturing plant includes full assembly, integration, and test facilities for both custom and production units. Electronic assembly techniques include computer-guided stitch wiring. High precision electro-optical test equipment is used to ensure machine surfaces and electro-optical assemblies adhere to exacting tolerances.

EXPERIENCE. MacDonald Dettwiler has served as prime contractor on large scale systems for the US Air Force, Swedish Space Corp, Australia Center for Remote Sensing, National Research Council of Thailand, Indonesian Space Agency, German Space Agency, European Space Agency, Swissair Transport Co Ltd, Canada Center for Remote Sensing, and Atmospheric Environment Service Canada. The company has also served as subcontractor to Bendix, TRW Systems, General Electric Co, Jet Propulsion Laboratories, NASA, Messerschmitt-Bölkow-Blohm (West Germany), National Space Development Agency of Japan, and Hitachi.

REVISED: Mar 90

MARTIN MARIETTA CANADA Ltd

ADDRESS: 1470 - 50 O'Connor Street
Ottawa, Ontario
Canada K1P 6L2

CONTACT: W Neil Russell, Director Business Development
Tel: (613) 232-6430
Fax: (613) 232-6698

KEYWORDS: Consulting; ATC (Systems Integration); ILS; Software Development; Software Verification; Systems Integration; Systems Management; System Studies

HISTORY: Martin Marietta Canada Ltd (MMCL) was established by the Martin Marietta Corporation to pursue high-technology business opportunities from a base in Canada.

CAPABILITY: MMCL's line of business is systems engineering, systems integration, and project management support for large scale aerospace, defense, electronics, and information management systems. The company's initial success was the winning of a \$42M four-year contract to lead a team of other Canadian companies to supply systems engineering, systems integration, and project management support (SEIP) for the modernization of Canada's air traffic control system. Building on that success, company growth is anticipated through other aspects of air traffic modernization, defense projects, space programs, and other government and corporate management information systems.

AVERAGE WORK FORCE: 120

GROSS SALES: No data.

PLANT SIZE: No data.

EQUIPMENT: No data.

EXPERIENCE: No data.

REVISED: Mar 90

MATROX ELECTRONIC SYSTEMS Ltd

ADDRESS: 1055 St Regis Blvd
Dorval, Quebec
Canada H9P 2T4

CONTACT: Mr Edward Dwyer, Vice President of Sales and Marketing
Tel: (514) 685-2630
Fax: (514) 685-2853

KEYWORDS: Board-Level Video Products; Video Products; Graphics; Imaging; Alphanumeric Display; Training; Process Control; Machine Vision; Financial Information Display.

HISTORY. Matrox Electronic Systems Ltd is a Canadian-owned company, founded by two electrical engineers in May 1976. For the past 14 years, the company has been designing and manufacturing board-level video subsystems for the microcomputer marketplace.

CAPABILITY: Matrox designs and manufactures video controllers targeted to several distinct markets: graphics, imaging, interactive videodisc, videographics, and financial information. Each market encompasses a large variety of applications, including CAC, interactive videodisc workstations, medical electronics, robotics, presentation graphics, machine vision, and process control.

AVERAGE WORK FORCE. Engineers – 257
Others – 348

GROSS SALES: 1988 – \$65M
1989 – \$100M

PLANT SIZE: 220,000 sq ft

EQUIPMENT: Complete digital electronics production facility. In-house computer systems include DEC and IBM.

EXPERIENCE: Present customers include various departments in the Canadian Government and industries in Canada, the US, Europe, and Asia.

REVISED: Apr 90

MBB HELICOPTER CANADA Ltd

ADDRESS. 60 Queen Street, Suite 1202
Ottawa, Ontario
Canada K1P 5Y7

CONTACT. Mr D P Chambers, Director, Export and Government Programs
Tel: (613) 232-1557
Fax: (613) 232-5454

KEYWORDS. Bk 117 Helicopter, BO 105 Helicopter, Flight Testing (Helicopters); Helicopters; R&O (Helicopters).

HISTORY. MBB Helicopter Canada Ltd began operation as Canada's first helicopter manufacturer in April 1984. The company was established as a result of a contract with the Federal and Ontario Governments, and is 95% owned by Messerschmitt-Boelkow-Blohm GmbH of West Germany and 5% owned by Fleet Aerospace of St Catharines, Ontario.

In 1986, MBB Helicopter Canada Ltd opened an 85,000 sq ft manufacturing plant in Fort Erie, Ontario. MBB Helicopter Canada Ltd has the world product mandate for the manufacture of the BO 105 LS helicopter, the latest in MBB's series of light, twin-engine helicopters. The BO 105 LS is especially designed for operations in areas of hot temperatures and high altitudes.

CAPABILITY. The capabilities at the Fort Erie, Ontario, facility range from research and development, systems integration, and flight testing to full scale product support. The production facility will provide for up to 38 helicopters at various stages of completion at any one time and a quality assurance section monitors this production at each assembly stage through to final approval of the flight-tested helicopter.

The Product Development Group's capabilities include preliminary design and development schemes, detailed electrical and mechanical design, specifications for materials and processes, final preparation of drawings, and load and stress analysis. There is a Writing Services Department that produces technical publications including maintenance, overhaul and repair manuals, and flight manuals.

AVERAGE WORK FORCE. Corporate – 5
Marketing – 6
Finance – 12
Engineering – 35
Operations – 45
Quality Assurance – 6

GROSS SALES: No data.

PLANT SIZE: 85,000 sq ft

EQUIPMENT: No data.

EXPERIENCE. MBB Helicopter Canada Ltd, as a subsidiary of Messerschmitt-Boelkow-Blohm GmbH (MBB), has access to a broad range of knowledge and expertise. MBB is a trusted partner around the world in various programs, including the TORNADO fighter aircraft, FANTRAINER primary training aircraft, AIRBUS transport aircraft, Space Labs, Satellites and Energy, and Environmental programs.

The company's Canadian customers include the Canadian Coast Guard, ALC Airlift Corporation of British Columbia, Ontario Ministry of Natural Resources, Sealand Helicopters, Toronto Helicopters, and the Department of National Defence.

REVISED: Mar 90

McDONNELL DOUGLAS CANADA Ltd

ADDRESS: Box 6013
Toronto AMF, Ontario
Canada L5P 1B7

CONTACT: Mr D Gene Siddall, President
Tel: (416) 677-4341
Fax: (416) 673-4343

KEYWORDS: Airframe Components, Bonded Components, Bonded Honeycomb Components; Coatings; Components (Airframe); Composite/Fiberglass Components; Extended Length Machining; Forgings; Fuel Systems; Heat Treating; Hydraulics; Machining; Metalworking, Structures, Tooling, Tubing, Wiring.

HISTORY: McDonnell Douglas Canada Ltd (MDCAN), a wholly owned subsidiary of McDonnell Douglas Corp, St Louis, Missouri, was federally chartered in July 1964 to manufacture aircraft and other aerospace products. The plant and head offices are located adjoining the Lester B Pearson International Airport, Toronto, Canada.

CAPABILITY. MDCAN is a fully integrated, high-technology manufacturer of major airframe structural components for both commercial and military jet aircraft. Capabilities include design assist for major components and full management and implementation of tooling concepts, and design and manufacture for McDonnell Douglas DC-8, DC-9/MD-80/MD-90, and DC-10/KC-10/MD-11 aircraft. On these programs, MDCAN has total project management responsibility, including material and sub-contract management. MDCAN has been a pioneer in manufacturing methods and equipment development, including substantial application of numerically controlled machines. Extensive work also has been done in the area of bonded metal components, and automated, machine-controlled drilling, riveting, and milling of spars manufactured from extended-length components.

MDCAN is a leader in the design and implementation of integrated computer-assisted management systems in the ongoing development of information resource management.

AVERAGE WORK FORCE. Engineers – 100
Machinists – 150
Tool Makers – 120
Others – 4200

GROSS SALES: 1988 – \$388.5M
1989 – \$343.6M

PLANT SIZE: 1,780,000 sq ft

EQUIPMENT. MDCAN's equipment is progressively updated to state-of-the-art with the result that MDCAN is a leader in computer-aided manufacturing in the Canadian aircraft industry. The equipment used at MDCAN is that of a well-equipped airframe manufacturing facility producing large, sophisticated airframe components such as MD-80 and MD-11 wings. Special equipment includes:

- Automated Hydraulic Powered Riveters – five 100'-long machines; five 50'-long machines.

- Numerical Control Equipment – 72 machining centers; 2 drill rivet/routers; 4 lathes; 1 coordinate measuring machine; 8 CNC presses; 1 digitizer plotter; and 2 tube benders.

- Computing Equipment – 1 IBM 4341; 2 IBM 3380; 2 DEC PDP11/70; 2 DEC VAX; and 2 Perkin Elmer 3250.

- Hydraulic Presses – 6 vertical and stretch form, up to 300 tons.

Other facilities include the Engineering Laboratory, heat treat, paint and process, and mechanized penetrant inspection units up to 100" in length.

EXPERIENCE: Since 1965, MDCAN has produced major fuselage structures for the DC-8 and major wing and fuselage structures for all commercial and military versions of the DC-9/MD-80 family. MDCAN was also active in the design and development of the DC-10, leading to design and manufacture beginning in 1968 of detail and assembly tooling for the DC-10 wing. Production deliveries of DC-10/KC-10 components continued uninterrupted to 1988 including several versions, both commercial and military. It was immediately followed by the MD-11. Tooling and production of F/A-18 structural components was begun in 1982, and production continues for aircraft destined to the US Navy, the Canadian Armed Forces, and other allied defense forces.

REVISED: Mar 90

MDS AERO SUPPORT CORPORATION

ADDRESS: Suite 202
1417-C Cyrville Road
Ottawa, Ontario
Canada K1B 3L7

CONTACT: Mr T E Miller, Senior Vice President
Tel: (613) 744-7257
Fax: (613) 744-8016

KEYWORDS: Engine Test Facility; Fuel Control; Systems Engineering; R&O (Engine Test Facilities); Ground Support Equipment; Field Service; Spare Parts; Facilities Design; Facilities Construction; Hush Houses; Data Acquisition Systems; Thrust Frames; Engine Adaptors.

HISTORY: MDS Aero Support Corporation is a Canadian-owned company providing systems engineering support for gas turbine engine test facilities. The company has its corporate office in Montreal, Quebec and its marketing, engineering, and manufacturing offices in Ottawa, Ontario.

CAPABILITY: MDS Aero Support Corporation is primarily involved in the design, engineering, construction, maintenance, and operational support requirements for engine test facilities. MSD's capabilities cover specialized engineering services for complete test facility design and construction as well as individual systems design, fabrication and installations including data acquisition systems, fluid control measurement systems, thrust standard engine adaptors, test stands, and prototype systems. MDT provides operational configuration management support for engine test facilities through the provision of field service representatives, documentation control, technical publications, training, engineering support, acoustical and vibration analysis, gas turbine engine-related performance studies, and repair and overhaul services.

AVERAGE WORK FORCE: Engineers – 20
Others – 25

GROSS SALES: 1988 – \$6.0M
1989 – \$6.0M

PLANT SIZE: 15,000 sq ft

EXPERIENCE: MDS Aero Support Corporation's present customers include various departments in the Canadian Government, aerospace industries in both Canada, Europe, and the US for both military and commercial engine test facility applications. The company is interested in doing business with the US military and commercial engine operators.

REVISED: Mar 90

MECAERO CANADA Inc

ADDRESS: 2250 Cohen
St Laurent, Quebec
Canada H4R 9Z7

CONTACT: Mr Farrell Campbell, Vice President
Tel: (514) 333-1235
Fax: (514) 745-7694

KEYWORDS: Fasteners; Bolts; Studs; Screws; Components (Machined); Shafts (Machined).

HISTORY: Mecaero Canada Inc commenced operation in November 1987. Associated with Mecaero S A of France, the company has been successful in transferring the technology and technical expertise from its facilities in France to the Canadian operation. Currently Mecaero Canada Inc is manufacturing components for the aerospace/defense industry.

CAPABILITY: Mecaero Canada Inc utilizes state-of-the-art equipment to manufacture specialized fasteners for the most demanding customers. With complete in-house capability, Mecaero manufactures a range of parts from .164" through 2.00" diameter.

AVERAGE WORK FORCE: Total – 58
Engs – 5
Quality – 6

GROSS SALES: 1988 – \$0.5M
1989 – \$1.8M

PLANT SIZE: 26,000 sq ft

EQUIPMENT: Vertical and horizontal forging presses, centerless grinders, thread rolling CNC lathes, and milling machines.

EXPERIENCE: Boeing, Canadair, DISC, DSS, McDonnell Douglas, Pratt & Whitney, Rolls-Royce.

REVISED: Mar 90

MEL DEFENCE SYSTEMS Ltd

ADDRESS: 1 Iber Road
Stittsville, Ontario
Canada K2S 1E6

CONTACT: Mr E W Derbyshire, Director Corporate Development
Tel: (613) 836-6860
Fax: (613) 836-6566/7681

KEYWORDS: ECM, Electronic Countermeasures, ESM, Electronic Support Measures, Electronic Warfare, Program Management, Software Development, Systems Integration, TEMPEST.

HISTORY: MEL Defence Systems Ltd is a wholly-owned subsidiary of Philips Canada Ltd, established in 1982 as a Canadian electronic warfare systems company.

CAPABILITY: MEL Defence Systems specializes in the design, development, manufacture and integration of naval, air, and land electronic warfare (EW) systems for Canadian and export markets. The company also provides contracted engineering consulting and program management services. In-house and contracted studies have been performed for the Department of National Defence on advanced naval, land, and air EW systems. Capabilities include research and development, software design and development, and simulation activities. The MEL Defence Systems' plant and CAD/CAM laboratory facilities are security cleared to SECRET level, as are all personnel associated with our military EW products. Manufacturing is certified to AQAP-1. MEL Defence Systems has full access to the substantial research, engineering, production, and marketing resources of the Philips Group of companies worldwide.

AVERAGE WORK FORCE: PhD & MSc - 6
Engineers - 40
Others - 108

GROSS SALES: 1988 - \$26.7M
1989 - \$32.7M

PLANT SIZE: 55,000 sq ft

EQUIPMENT: Secure electronics assembly, integration and testing facility, 600 sq ft of TEMPEST-shielded environment for support of EW research and development, software development and program generation and simulation activities, and CAD/CAM microwave and digital laboratories supported by a central in-house DEC computer system comprising VAXs and microVAXs.

EXPERIENCE: MEL Defence Systems' principal customer is Canadian Department of National Defence.

REVISED: Apr 90

MENASCO AEROSPACE Ltd

ADDRESS: 1400 South Service Road West
Oakville, Ontario
Canada L6L 5Y7

CONTACT: Mr Eric Eriksmoen, Vice President Marketing
Tel: (416) 827-7777
Fax: (416) 825-1583

KEYWORDS: Airframe Components; Control Systems; Flight Control Actuation Systems, Ground Steering Systems, Hydraulics, Landing Gear Components, Landing Gears, Wing Actuation Systems

HISTORY: Menasco is a wholly owned subsidiary of Colt Inc (US) and was organized in 1971.

CAPABILITY: Menasco designs, develops, test, and manufactures fixed-wing aircraft and helicopter landing gear systems. Also included in this capability are electro-hydraulic and hydro-mechanical systems related to primary and secondary flight controls; fly-by-wire electro-hydraulic flight controls; ground steering, including steer-by-wire; aircraft hydraulic systems; variable wing and wing sweep actuation and machining of aircraft and helicopter components. They meet contractor and quality control standards as specified by FAA, DOT, MIL-Q-9858A, and AQAP-1. Physical and environmental testing is accomplished with, among other facilities, three drop test towers which can also measure landing gear shimmy and steering characteristics. Brochures available upon request.

AVERAGE WORK FORCE: Engineers - 62
Manufacturing - 329
Others - 164

GROSS SALES: 1988 - \$88M
1989 - \$90M

PLANT SIZE: 220,000 Sq Ft

EQUIPMENT: Complete physical and environmental testing laboratory for landing gear, flight controls and actuating devices, including facilities for vibration, structural, stress survey, fatigue testing, and full complement of NC equipment and a computerized design and engineering system. Production control and inventory are computerized

EXPERIENCE: Menasco Canada has produced equipment for the following manufacturers and aircraft: Boeing (727, 737, 757, C-141, CH-46, V-22), Bell (YAH-63, XV-15), Canadair (Regional Jet) (CL-41, CL-84), deHavilland (DHC-4, DHC-5, DHC-7), Fairchild Republic (A-10), Fokker (F-28, Fokker 100), General Dynamics (F-111), Lockheed (C-141, C-5A,B); McDonnell Douglas (C-17, DC-10, KC-10, MD-80); Short Bros (SD3-30); and Sikorsky (CH-53). Program and facilities have been approved by major military prime contractors and government agencies in the US and Canada.

REVISED: Mar 90

METRO MACHINING CORPORATION

ADDRESS: 7926 - 15th Avenue (St Michel)
Montreal, Quebec
Canada H1Z 3N6

CONTACT: Mr Bernard Coursimault, President
Tel: (514) 374-0791

KEYWORDS: Machining, Airframe Components, Components (Airframe), Components (Landing Gear), Components (Aluminum), Components (Titanium); CNC Machining.

HISTORY: Metro Machining Corporation is a high-technology, CNC machining center founded in October 1973. The company is Canadian owned.

CAPABILITY: Metro Machining Corporation is primarily involved in producing aluminum and titanium air frame components from small to medium size, using 3 to 5 axis equipment. The company also produces landing gear components, heat treated up to 300 °Si.

AVERAGE WORK FORCE: Management - 6
Others - 45

GROSS SALES: 1988 - \$3.0M
1989 - \$4.1M

PLANT SIZE: 21,000 sq ft

EQUIPMENT: Various CNC equipment, single and multi-spindle up to 5 axis including programming system NCL No. 501 APT.

EXPERIENCE: Present customers include McDonnell Douglas Canada Ltd, Heroux Inc., Canadair Ltd, Bell Helicopter, and Menasco.

REVISED: Mar 90

MICRONAV Ltd

ADDRESS: PO Box 1523
Sydport Industrial Park
Sydney, Nova Scotia
Canada B1P 6R7

CONTACT: Mr Nick Coyle, President
Tel: (902) 564-8833
Fax: (902) 564-8764

KEYWORDS: MLS: Precision Approach System; Airport Equipment; ATC; DME; Non-Directional Beacon.

HISTORY: Micronav is a Canadian owned manufacturer of airport microwave landing systems (MLS) ground transmitting equipment. The company was founded in 1981, and in 1988 was acquired by Leigh Instruments Ltd, Ottawa, Ontario, for which it operates as a wholly-owned subsidiary.

CAPABILITY: Micronav has designed and is now manufacturing MLS equipment meeting International Civil Aviation Organization standards. The company's MLS has been installed at airports in Eastern and Western Canada. MLS design and manufacturing disciplines include microwave technology, hardware and software design and development, systems management, product assurance (including reliability and failure mode and criticality analysis), production, quality assurance, documentation and training. Airport installation disciplines include site and soils surveys, foundation design, power and mechanical installation, general construction, on-site equipment test and checkout, and field service support. These disciplines can be applied to other products or projects on a contract basis.

AVERAGE WORK FORCE: Engineering - 50
Others - 35

GROSS SALES: 1988 - \$0.9M
1989 - \$1.6M

PLANT SIZE: 30,000 sq ft

EQUIPMENT Complete digital/analog and microwave production facility. Microprocessor software development systems. Temperature test chamber, Microstrip circuit fabrication shop. MLS production test range.

EXPERIENCE Present customers include Transport Canada and regional airports. Micronav is currently negotiating a contract with Transport Canada to provide 42 microwave landing systems. Specific installations include MLS-400 plus associated DME/N, Port Hawkesbury, NS, and MLS-400 plus associated DME/N and 2 non-directional beacons, Pemberton, BC. Two MLS 400T systems will be installed at Toronto Island Airport in Aug 90 under a contract from Transport Canada.

REVISED: Mar 90

MICROTEL PACIFIC RESEARCH Ltd

ADDRESS: *Head Office:*
8999 Nelson Way
Burnaby, British Columbia
Canada V5A 4B5

Branch Office:
Suite 2000, Tower A
320 Queen Street
Ottawa, Ontario
Canada K1R 5A3

CONTACT: Mr Alistair W Taylor, Director, Business Development
Tel: (604) 293-5705
Fax: (604) 293-5787

KEYWORDS: Communications Consultants; Communications Systems; Digital Communications; Digital Signal Processing, EHF Satellite Communications; Emergency Locator Beacons; Expert Systems; Hybrid Circuits; MMHICs; MMICs, Microelectronics, Microwave Subsystems, Millimeter Wave Subsystems; RF Communications, Satellite Communications, Software Development, Storage of Digital Imagery, VLSI.

HISTORY: Microtel Pacific Research Limited (MPR) was incorporated in 1979 and a fully-owned subsidiary of BC Telephone Company (BC Tel). Through its parent companies, Automatic Electric and Lenkurt Electric of Canada, MPR's history spans over eight decades.

CAPABILITY: MPR offers the aerospace industry a wide range of design and fabrication services. These include components such as application-specific integrated circuits (ASIC), thick film hybrids, hybrid and monolithic microwave integrated circuits, complex subsystems such as transmitters and receivers, and complete systems, including large software systems for communications network management.

MPR is currently active in microwave landing systems (both ground and airborne segments), civilian and military EHF satellite communications, space based radar, and search and rescue satellite beacons. Other areas of expertise include commercial and military airborne radar, air-to-ground communications, navigation, and EW systems.

As Canada's largest design house for satellite earth station engineering, MPR is a recognized leader in advanced microwave, modem, and associated signal-processing technologies. MPR was responsible for the system design, terminal design, and development of the satellite communications system which provides the transmission backbone for the \$268 million NWS contract awarded by National Defence in 1986.

MPR was selected as prime contractor for DND's \$28 million "FASSET" R&D project, involving the design and integration of an advanced development model of an EHF SATCOM system for evaluation and test. Consisting of two ground terminals and a ground-based payload model, the system incorporates advanced processing techniques to achieve secure, survivable communications links in an ECM environment.

MPR has designed two major commercial satellite communications systems: the SPACETELTM SCPC thin route voice/data system used extensively in remote locations of western and northern Canada, the US, and overseas, and a two-way VSAT system using TDM/TDMA technology for interactive data communications. These projects demonstrate MPR's ability to design and implement all aspects of complex, integrated hardware/software systems.

MPR is continuing to invest in advanced technology development. Significant successes to date include a variable data rate (up to 2Mb/s), variable coding rate, k=7, 1/2 rate Viterbi decoder. This device incorporates over 140,000 transistors on a 0.4 inches square. Recent technology development permits integrating several silicon and/or gallium arsenide chips on a single carrier. The high-density interconnect system provides an extremely high level of integration of both analog and digital signal processing functions in a single, very compact, extremely light weight package.

MPR also has two major research projects supported by the Canadian Department of National Defence: Monolithic Microwave Integrated Circuits (MMIC) and Miniature Hybrid Microwave Integrated Circuits (MHMIC). MMIC design and component fabrication services are currently available. Similar MHMIC services will be available commercially in 1991.

Other technologies currently being commercialized include still image and audio compression, expert systems, and broad band fibre optics communications.

AVERAGE WORK FORCE: Technical staff - 325
Support staff - 100

GROSS SALES: 1988 - \$32.5M
1989 - \$40.0M

PLANT SIZE: R&D facilities in BC - 103,000 sq ft
Branch office in Ottawa - 12,000 sq ft
Pacific Design Engineering Ltd (Burnaby) - 9,000 sq ft
Synertech (Portland, Oregon) - 8,000 sq ft

EQUIPMENT. 5500 sq ft of microelectronic clean room facilities of which 1,000 sq ft are Class 100 or better. Microelectronic test equipment includes LT X 77 Analog/Digital Test System, HP 8510 Vector Network Analyzer; Cascade RF Wafer Prober; burn-in ovens; environmental chambers, and chip-packaging equipment. Extensive electronic laboratories which are well equipped with high quality digital, analog, RF, and microwave test equipment operating over the range from DC to 26 GHz. Anechoic chamber (7 ft x 8 ft x 14 ft) for electromagnetic compatibility testing. Extensive mainframe (VAX/UNIX) and distributed computing facilities.

EXPERIENCE. MPR's customers include the Canadian Government (Department of National Defence, Department of Communications, Communications research Centre, Department of Transport, National Research Council, etc.) as well as a broad cross section of private industry. Canadian firms include the BC Tel Group, CNCP, Newbridge Networks, NovAtel Communications, Octel, Telesat Canada, Telesat Mobile, Pelorus Navigation Systems, and Prism Systems. Major accounts headquartered in the US include GTE Corporation, ADC Telecommunications, Digital Switch Corporation, Intelsat, and Tellabs Communications. Extensive work has also been carried out for New Zealand Telecom.

REVISED: Mar 90

MONAC INTERNATIONAL Corp

ADDRESS: 435 Ellice Avenue
Winnipeg, Manitoba
Canada R3B 1Y6

CONTACT: Dr M Nabil Bassim, Principal and Executive
Vice President
Tel: (204) 943-6797
Fax: (204) 949-9021

KEYWORDS. Nondestructive Evaluation, Acoustic Emission, Continuous Monitoring Systems, Fatigue, Fracture, Crack Growth Rate, Structural Integrity; Bridges; Pipelines; Aircraft Fatigue Measurement; Civil Structures.

HISTORY: MONAC is a publicly traded Canadian company based in Winnipeg, Montreal, and New York City. Its objective is to commercialize patents on the use of acoustic emission for continuous monitoring of large structures.

CAPABILITY: MONAC has developed an expert system with artificial intelligence capability for continuous monitoring of acoustic emission due to fatigue and leak in large structures. The patented approach evaluates the rate of fatigue crack growth and hence, determines the remaining life in a structure. MONAC provides either systems or service for testing specific structures. MONAC has applied its technology commercially to the evaluation of bridges, aircraft, and power generation equipment.

AVERAGE WORK FORCE. PhDs - 2
Engs - 5
Others - 7

GROSS SALES: 1989 - \$500K

PLANT SIZE: 5,000 sq ft

EQUIPMENT: In-house computer systems, assembly facility for MONAC systems.

EXPERIENCE: Canadian National Railways, Department of National Defence, Manitoba Hydro, National Research Council.

REVISED: Mar 90

MONITEQ Ltd

ADDRESS: 630 Rivermede Road
Concord, Ontario
Canada L4K 2H7

CONTACT: Mr N J Reid, Manager Sales and Marketing
Tel: (416) 669-5334
Fax: (416) 669-3823

KEYWORDS: Remote Sensing; Data Acquisition; Image Analysis; Airborne Imaging Systems; CCD Evaluations; Water Quality; Watershed Management; Environmental Monitoring; Spectral Analysis.

HISTORY. Moniteq is a privately-held, Canadian-owned, remote sensing company established in 1976.

CAPABILITY: Moniteq is primarily involved in providing airborne digital image acquisition services for applications in water quality, wetlands, and natural resource mapping. Moniteq also designs airborne imaging systems and offer customized CCD camera applications. Moniteq developed the programmable multispectral imager (PMI), the world's first commercial imaging spectrometer systems. The PMI has been operated around the world for a variety of research and resource management applications.

AVERAGE WORK FORCE: PhD - 2
Engs - 7
Other - 6

GROSS SALES: 1988 - \$1.0M
1989 - \$1.0M

PLANT SIZE: 5,850 sq ft

EQUIPMENT. VAX 750, 6 PCs, 2 Gould image processing stations. 3 high resolution Contrac monitors, CCD data acquisition, and test facility.

EXPERIENCE: Present customers include European Space Agency, Cornier, MBB, various Canadian Federal and Provincial government agencies, Ontario Hydro, Potash Company of America, Adirondack Park

Agency, York University, and the Institute of Space and Terrestrial Science, as well as several civil engineering companies

REVISED: Mar 90

MONTREAL PRECISION CRAFTING Ltd

ADDRESS: 797 Lajoie
Dorval, Quebec
Canada H9P 1G7

CONTACT. Mr Gerry Mancini, President
Tel: (514) 636-0823
Fax: (514) 636-9550

KEYWORDS CNC Machining, Machining, Precision Machining

HISTORY: Montreal Precision Crafting Ltd is a Canadian-owned machine shop that performs both industrial and aircraft machine work. It has been in existence since 1969.

CAPABILITY: Montreal Precision Crafting Ltd performs highly technical work and designing for all types of commercial and aircraft work. The company is engaged in all types of manufacturing and designing.

AVERAGE WORK FORCE: Management - 3
Others - 15

GROSS SALES: 1988 - \$495K
1989 - \$560K

PLANT SIZE: 5,000 sq ft

EQUIPMENT: \$100K and more of standard machine shop equipment including lathes, milling machines, and drill presses.

EXPERIENCE: Montreal Precision Crafting Ltd's customers include Pratt & Whitney (United Aircraft), Noranda Research, Bell Canada, Canadian Explosives, Department of National Defence, Leigh Navigations Systems, MPB Technologies, Man Ashton, Peacock Ltd, Canadian industries, Proctor & Gamble, Noram Quality Controls, Avon Products, Beloit Canada, McGill University, Goodyear of Canada Ltd, and Northern Telecom.

REVISED: Mar 90

MPB TECHNOLOGIES Inc

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KEYWORDS. Antennas, CO2 Lasers, Communications, Displays, Electromagnetics, Fiber Optics Communications, Graphics, Instrumentation; Laser Communications; Lasers; Laser Instruments; Microwave Instruments; Optical Instruments; Radar; Satellite Communications; Sealed-Off Lasers; Synthetic Pulsed Radar; Training; Robotics.

HISTORY: MPB is a Canadian-owned high-technology company that was incorporated in 1976. It is a spin-off from RCA Ltd.

CAPABILITY: MPB Technologies Inc occupies a modern 30,000 sq ft installation in Dorval, a suburb of Montreal, Quebec. The Electromagnetics, Electronic Systems, and Space and Photonics Divisions are located in a modern 70,000 sq ft facility in Pointe Claire, Quebec. MPB Technologies Inc is fully facilitated for conducting experimental, theoretical, and developmental work and manufacturing in lasers, electromagnetics and radars, digital electronics, communications, and instrumentation.

- **LASERS** – Laser work includes the design and development of CO2 continuous wave lasers (1-20 watt range, >10,000 hours lifetime, sealed off) and CO2 waveguide lasers with wide band width and good tunability (sealed off, 10,000 hours lifetime). MPB has been involved with heterodyne detection techniques in conjunction with optical fiber hydrophones that can measure 1/500 of a fringe (phase shift 360/5000). They are involved in programs on the application of lasers to satellite communications (MIL-SATCOM) and have developed a laser communications test bed and propagation measurement facility for a Canadian Government laboratory. Current work involves development of a 1 GHz band width communications system based on solid state lasers, and waveguide lasers with ceramic envelopes. A spin-off from this work has been a land based laser communications system. Other areas of laser-related work are custom designed systems based on HeNe, Nd Yag semiconductor and chemical lasers, optical coherent radar, and nondestructive testing.

- **ELECTROMAGNETICS AND RADAR TECHNOLOGY** – In the area of electromagnetics and radar technology, MPB has carried out research with synthetic pulse radar for airborne measurement of sea ice thickness at VHF and UHF, and in the area of radar/chaff interaction from 8 to 80 GHz, target RCS enhancement and reduction at 6 to 18 GHz. They have been involved with communications analysis (cross polarization effects, earth and satellite communications, ship RF and EM), and mine detection using electromagnetic techniques and antenna research (wide-band VHF antennas). The company delivered an airborne C-band scatterometer for measurements of ice surface roughness and a 6 channel millimeter wave radiometer (from 20 to 60 GHz) for remote sensing of the atmosphere. Further developments include a 60/90 GHz airborne radiometer, a 35 GHz doppler fragmentation measuring radar, and a 90 GHz coherent radar. The company is involved in projects related to target augmentation and to deployment of chaff including the NATO MACE Trials.

- **DIGITAL ELECTRONICS** – In the digital electronics area, MPB has expertise in electronic graphics, displays, training systems, and graphic composition. They have also been involved with special purpose communication terminals (transcontinental telex operator communications) and special purpose data recorders (based on microprocessor technology).

- **INSTRUMENTATION** – In the area of instrumentation, MPB is involved with a Space Shuttle experiment (wave injection facility), where their main responsibility is the software for the control electronics and the system test equipment. MPB has built a shuttle experiment for growth of GaAs under microgravity conditions and are in the process of building a shuttle experiment for laser/materials interact. Their contribution to the Tokamak de Varennes experiment includes the plasma pre-ionization, diagnostic instrumentation (probes, lasers, microwave interferometry), and software development (controls and on-line data analysis), and the complete control and data acquisition system.

- **PRODUCTS** – MPB products include the VISTA 90 electronic graphics and composition system. The system permits the composition of picture-quality graphics by various input devices and hard copy through a choice of 35mm slides, printer, or video tape. Their laser communications system is capable of video, multiple voice channel, or high bit rate digital transmission. The system has a video signal-to-noise ratio greater than 60 db and is immune to RF interference. They have made major sales to the US of their sealed-off CO2 lasers that are long lived (greater than 38,000 hours) and have power ranges from 3 to 12 watts TEM¹ and 1 to 18 watts multimode. The company also manufactures a complete line of industrial CO2 lasers which range from 50 to 200 watts and other laser products.

AVERAGE WORK FORCE: PhD – 33
Engineers – 77
Others – 70

GROSS SALES: 1988 – \$15M
1989 – \$30M

PLANT SIZE: 30,000 sq ft (Dorval)
70,000 sq ft (Pointe Claire)
5,000 sq ft (Ottawa)

EQUIPMENT. Equipment includes hydrogen oven for high temperature ceramic band seals, millimeter wave instrumentation, ASIC design center based in Mentor Graphics CAE systems, prototype center, CAD design center, reliability test laboratory, clean rooms rated at 10,000, laser materials processing and test facilities, scientific glass center, optical fiber facility, laser production facility, extensive electromagnetics measurement facilities (20MHz to 18 GHz) to include EMC test cell anechoic chamber and high power microwave sources, extensive in-house computer facilities, TEMPEST secure room, clearance to NATO secret classification.

EXPERIENCE. MPB's typical clients include the Canadian Government (Department of National Defence, Communications Research Center, National Research Council), AFOSR, CBC, SPAR Aerospace Ltd, Telesat Corp, Teleglobe Canada, Br Telecom, PTT (France), plus others. Recent US customers have included the Department of Energy (Nevada Division), Hughes Aircraft, RCA Astroelectronics, AT&T, USAF (Hanscom Field), USA (Ft Belvoir) and National Oceans and Atmospheric Administration. More than 70% of MPB's business originates from outside of Canada.

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MYRIAS RESEARCH Corp

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10611 – 98th Avenue
Edmonton, Alberta
Canada T5K 2P7

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Fax: (403) 421-8979

KEYWORDS Cartography Processing & Database, Computers, Computers (Parallel), Cryptography, Distributed Processing, Meteorology, Parallel Processing, Quantum Chemical Modelling, Reservoir Modelling; VLSI Simulation.

HISTORY Myrias Research Corp is a Canadian-owned corporation established in 1982 to design, manufacture, sell, and service computer hardware and software for high-speed parallel computing. The company has a wholly-owned subsidiary in Boston, Massachusetts, called Myrias Computer Corp.

CAPABILITY Myrias Research Corporation has developed a computing system that combines a multiprocessor architecture, the Myrias Scalable Parallel Supercomputer (SPS), with a powerful software mechanism, the Parallel Application Management System (PAMS), to provide high-performance computing. Myrias SPS systems have the first truly expandable computer architecture. Minimal configurations of the SPS-2 contain 64 microprocessors (Motorola 68020, 16.7 Mhz) and 256 MBytes of memory, with the largest configuration to date consisting of 1044 processors and over 4 gigabytes of memory.

The Myrias system is designed for software portability, a simple programming model allows you to convert existing application programs or to create new ones easily. The process of converting applications developed for other systems is straight forward, and the Myrias architecture ensures complete portability of your programs across different generations of Myrias hardware and software. The Myrias system has little overhead, so a substantial portion of system resources are applied to the execution of your programs, resulting in high computational speeds and an excellent price/performance ratio. The Myrias system is easily programmable and POSIX/UNIX compliant.

AVERAGE WORK FORCE: 120 employees in Canada and the US including 6 PhDs.

GROSS SALES: 1989 – \$3.5M

PLANT SIZE: 40,000 sq ft

EQUIPMENT. The company is fully equipped for the design and manufacture of specialized computer systems. Their inventory of computer systems, work stations, and peripherals is extensive.

EXPERIENCE. The company has customers in Canada and the US including the US government.

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NATIONAL ENGINEERING & SCIENCE ASSOCIATES Inc

ADDRESS: 367 Water Street
PO Box 1
Stratford, Ontario
Canada N5A 6S8

CONTACT: Ms Kathleen Engberg, PEng, Vice President
Engineering
Tel: (519) 271-6710
Fax: (519) 271-6454

KEYWORDS: TEMPEST Enclosures; EMI-NEMP-EMP Shielding; Red-Black Enclosures; Shielded Rooms; Modular Design; Portable Shielded Rooms; Sheet Metal Fabrication; Shielded Racking Cabinets

HISTORY: National Engineering & Science was founded in 1978. In 1983, it purchased its manufacturing division (Jones 83 Mfg Co) in Stratford and proceeded to develop its abilities in production of electronic cabinetry including shielded enclosures. In 1987, shielded rooms were developed.

CAPABILITY: National Engineering & Science designs and manufactures shielded enclosures, including modular rooms, through use of CAD/CAM, CNC/DNC turret punch press, brake bending, and welding to Canadian standards.

AVERAGE WORK FORCE: Engineers & Science Degrees - 3
Drafting & Programming - 2
Others - 15

GROSS SALES: 1988 - \$1.8M
1989 - \$2.0M

PLANT SIZE: 27,000 sq ft

EQUIPMENT: CAD/CAM, PC-based MIS, CNC 56 station turret punch press, CNC brake (brake bending to 300 tons), stamping presses to 225 tons, MIG and TIG welding in steel and aluminum, spot welding to 90KVA in steel, and batch painting system

EXPERIENCE: Present customers include the Canadian Government as well as other NATO requirements. We are interested in accessing the US military market for field equipment, office equipment, and laboratories as well as any other areas.

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NAVAIR Ltd

ADDRESS: 2450 Derry Rd East, Hangar #2
Mississauga, Ontario
Canada L4T 3B6

Government Liaison Office
275 Slater Street, Suite 320
Ottawa, Ontario
Canada L4Z 2G6

CONTACT: Mr Terry Malone, Branch Manager
Tel: (613) 232-8323
Fax: (613) 232-3435

KEYWORDS: Avionics Training, Modification (Aircraft/Avionics), R&O (Avionics), Telecommunications Test Equipment.

HISTORY: Navair Limited is a Canadian avionics installation, repair, and overhaul facility. Formally incorporated as Navair Limited in 1971, the company was originally established as the Field Aviation Avionics Division in 1959 and has a long history of service to both the North American and overseas aircraft industry from its base at the Lester B Pearson International Airport in Canada. In 1988 Navair Limited became a subsidiary of Field Aviation Company Limited (see separate listing).

CAPABILITY: Navair Limited has three distinct spheres of operation:

- Avionics sales, installations, repairs and overhaul. Avionics installations are performed in all types of aircraft, including survey and reconnaissance aircraft; piston-engined, turbine and jet aircraft; military and government aircraft such as the Lockheed C-130 and Electra L-188, deHavilland DHC-5D Buffalo and DHC-6 Twin Otter, Convair 540, and Grumman G1 (commercial). The repair and overhaul section has a full range of facilities and fully qualified personnel for servicing the most sophisticated avionics systems.
- Test equipment sales, repair, overhaul and re-calibration for the avionics and telecommunications industry are performed at the Navair facility.
- Preparation and instructing of training programs in avionics and aircraft systems to all levels. This includes the design and supply of "turnkey" workshop facilities for customers in various parts of the world.

Navair Limited operates under strict quality control procedures and is a designated approved company by the Canadian Ministry of Transport (MOT Approval No 13-74). It is authorized to certify avionics installations and modifications (including structural modification) up to and including Boeing 727 and 737. Navair maintains a Canadian military AQAP-1 quality assurance approval standard.

AVERAGE WORK FORCE: 54 (with additional contract personnel as required)

GROSS SALES: 1988 - 10.0M
1989 - \$12.5M

PLANT SIZE: 7,500 Sq Ft (office and service facilities)
6,000 Sq Ft (hangar space)

EQUIPMENT: Full complement of test equipment for full-range avionics repair and overhaul; hangaring and aircraft storage facilities for most aircraft; engineering drafting departments; full auto CAD; and classrooms and equipment (including audio-visual) for training programs. The company has word processing/document formatting and full, in-house, desktop publishing capability.

EXPERIENCE: Present customers include various departments in the Canadian Government such as Transport Canada, National Defense, and Coast Guard and the deHavilland Aircraft Company Ltd.

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NEWTECH INSTRUMENTS Ltd

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St John's, Newfoundland
Canada A1B 4G1

CONTACT: Mr Henry Tremblay, Vice President, Marketing
Tel: (709) 576-6666
Fax: (709) 476-7635

KEYWORDS: Ocean Current Profiling Systems; Ocean Current Direction Measurement; Ocean Current Speed Measurement; Ocean Temperature Measurement; Salinity Measurement; Copper Telecom

Cable Splice Closure Product, Build-To-Print Electro mechanical Assemblies, Wire Harnesses.

HISTORY: NewTech Instruments Inc is a Canadian-owned, electronics design and manufacturing firm providing quality products and services to the marine, communications, and defense industries. The company was formed in 1936 to develop, manufacture, and market marine technology. Its first product was Hydroball, an instrument used worldwide to measure water temperature and ocean currents. In the past several years, the company has expanded its operations to include a unique copper telecommunications cable splice closure product as well as the development of various electronic and electro-mechanical assemblies.

CAPABILITY: NewTech Instruments Ltd has specific expertise in the areas of acoustics, build to print electronic electro-mechanical assemblies requiring high-quality standards.

AVERAGE WORK FORCE: Engineers - 2
Electronic Engineers - 3
Other Professionals - 2
Electronic Technicians - 4
Others - 3

GROSS SALES: No data.

PLANT SIZE: 5,000 sq ft

EQUIPMENT: Complete electronics productions facility; anti-static climate-controlled room, potting shop for acoustic transducers, hydrostatic test equipment. Associated facilities include acoustic tank, seakeeping (wave) tank, and tow tank.

EXPERIENCE: Products and/or services have been provided to General Motors Diesel Division, Italian Antarctic Project, Admiralty Research Establishment, BritSurvey, WS Ocean Systems, Louisiana State University, Evans-Hamilton Inc, Centre for Cold Ocean Resources, Newfoundland Telephone Co Ltd, Department of Fisheries and Oceans, Ultimateast Data Communications Ltd, and Department of National Defence.

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NORTHWEST INDUSTRIES Ltd

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Edmonton, Alberta
Canada T5J 2T2

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Tel: (403) 890-6300
Fax: (403) 890-7773

KEYWORDS: Airframe Components; Airframe Structures; Components (Airframe); Control Cables (Aircraft); Die Fabrication; Flight Surface Manufacture; Hydraulics; Installations & Servicing; Instrument Repair; Non-Destructive Testing; R&O (Aircraft); R&O (Avionics); Sheet Metal Fabrication; Structural Components Manufacture; Structural Modification; Technical Publications Production; Technical Writing; Tooling; Tubing Assembly Fabrication; Wiring Harness Fabrication.

HISTORY: Northwest Industries Ltd, incorporated in 1943, is a subsidiary of CAE Industries Ltd, Toronto, Ontario, Canada.

CAPABILITY: Northwest Industries Ltd (NWI), a recognized DND quality assurance and NATO AQAP-1 company, is one of Canada's principal aircraft maintenance contractors experienced in the overhaul and modification of military and commercial aircraft, including CF-18 Hornet and CF-104 Starfighter, T-33 and CL-41 jet trainers, and C-130 Hercules transports. The company provides a comprehensive aircraft maintenance service from minor inspection to major overhaul including non-destructive testing, airframe life extension and corrosion control, airframe parts and components manufacture, hydraulic, mechanical

and electrical systems overhaul, lines and cable manufacture, electrical wiring fabrication, instrumentation repair and calibration, and avionics systems installation and integration.

NWI's Technical Publications group produces military and commercial manuals, technical orders, and modification leaflets in direct support of the company's aircraft modification programs, or as separate publication contracts. Utilizing photography, typesetting, word processing, and computerized electronic publishing system techniques, the group undertakes the technical writing and illustration of documents from raw data through to final text, artwork, and printing.

NWI's manufacturing shops are utilized primarily in direct support of in-house programs with limited participation with outside activities. The company does, however, manufacture lines, cables, and various fluid tanks for DND, and produces the sophisticated mechanical cable assemblies incorporated in the Spar Aerospace remote manipulator arm of the NASA Space Shuttle.

AVERAGE WORK FORCE: Engineering - 26
P Eng - 3
Quality Control - 39
Production - 215
Admin & Others - 93
Tech Publications - 52

GROSS SALES: No data.

PLANT SIZE: 250,000 sq ft (Edmonton International Airport)
Modern hangars at the Edmonton International Airport accommodate aircraft to the size of the Boeing 747)

EQUIPMENT: Test and Inspection Equipment - avionics electronics, electrical hydraulics and mechanical test equipment, and Mitutoyo 241 Series co-ordinate measuring machine, Eddy-Current, dye penetrant, ultrasonic, and radiographic equipment.

Production Equipment - precision tube bender up to 3 1/2" OD capacity, cable swaging, splicing and proof loading; and heat treatment, cadmium plating, alodizing sheet metal fabrication, welding, and painting.

EXPERIENCE: Northwest Industries Ltd customers include Government of Canada Department of National Defence, United States Air Force, Spar Aerospace, and other major aircraft manufacturers and operators. The company holds Canadian Department of National Defense AQAP-1 (MIL-Q-9858A) approval, Canadian Ministry of Transport Approval 3/57, and US Federal Manufacturers Code 35598.

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NOVA SCOTIA RESEARCH FOUNDATION Corp

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PO Box 790
Dartmouth, Nova Scotia
Canada B2Y 3Z7

CONTACT: Dr Douglas S. Rankin, Marketing Director
Tel: (902) 424-8670
Fax: (902) 465-7384

KEYWORDS: Analytical Chemistry, Environmental Chemistry, Chemistry; Biology; Coal Technology; Engineering Services; Product Development; Magnetic Couplings, Diving Life Support Systems, Zero Leakage Blowers.

HISTORY: Nova Scotia Research was established in 1946 by the Province of Nova Scotia to use science and technology to assist in the economic development of Nova Scotia

The three operating divisions, Product Development, Applied Science, and Industry Services, carry out technical assignments for 600 companies and government departments each year.

The corporation pursues two main goals. (1) assistance to industry in the solution of today's technical problems, and (2) product/process innovation in anticipation of tomorrow's opportunities. While the corporation serves all sectors of Nova Scotia's industrial economy, it emphasizes technological support for secondary manufacturing industry and takes a special interest in developing Nova Scotia's ocean industry potential.

CAPABILITY. Nova Scotia Research's capabilities are in the areas of applied science, industry services, and product development. Analytical and environmental chemistry, biology, coal technology, geoscience data, and corrosion and materials-related technology comprise areas of expertise in applied science. Technical assistance for small and medium-sized manufacturers is provided to improve productivity and technological capabilities. Engineering, manufacturing, and marketing services are available for product development and export sales. A specialty product is a line of magnetic couplings providing seal-less couplings where zero-leakage pumps or blowers are required. A new environmental test centre (ETC) provides tests to MIL-STD 8101 and 202F.

AVERAGE WORK FORCE: PhDs - 9
Engineers - 28
Others - 60

GROSS SALES: 1988 - \$3.8M
1989 - \$4.2M

PLANT SIZE: 4 buildings

EQUIPMENT. CNC precision machining equipment and various computers for CAD/CAM and office management.

EXPERIENCE: Customers include several small and medium-sized manufacturing companies in Canada and worldwide, as well as the Canadian Forces Defense Research Establishments.

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NOVATRONICS Inc

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677 Erie St
Stratford, Ontario
Canada N5A 6V6

CONTACT Ms Laraine Murray, Director of Sales
Tel: (519) 271-3880
Fax: (519) 271-9781

KEYWORDS: Precision Electromechanical Devices; Sensors; Actuators; Indicators; Instruments; Flight Control Systems; Cockpit Indicators (Electromechanical); Synchros; Resolvers; RVDTS; Brushless DC Motors; Servo Motors.

HISTORY: Novatronics Inc is a privately-owned Canadian company focused on the research, development, and manufacture of custom precision electromechanical systems and devices and related electronics for precision indication, actuation, and control of mechanical motion/position.

The company was established in 1955 as Muirhead Instruments Ltd, a subsidiary of Muirhead and Company, United Kingdom. It was acquired in 1969 by Novatronics Inc of Pompano, FL, and was sold in 1983 to the present owner, Donald J McDougall of London, Ontario.

CAPABILITY. Novatronics Inc is primarily a developer and manufacturer of custom precision electromechanical devices and related electronics for the aircraft/aerospace/defence industries. Products include the following:

- Sensors - Synchros, resolvers, tachometers, rotary linear transducers (RLTs, RVDTS), and linear inductive transducers (LITs, LVDTs).
- Indicators - Cockpit indicators, digital indicators (electromechanical types).

- Motors/Actuators - Stepping motors, servo motors, brushless and brush-type DC motors, rotary and linear actuators, and solenoid/valves.

- Electronics - Signal conditioning and processing, logic and control circuitry, A/D conversion, etc.

- Systems - Systems incorporating the above elements.

Novatronics has capabilities in the following areas.

- Design and Development - Full engineering design and development capabilities exist in the company, including qualified engineering staff supported by CAE/CAD systems, prototype shops, and environmental test facilities.

- Manufacturing Facilities - High-precision manufacturing is achieved through modern CN and NC machining equipment, along with specialized winding and assembly equipment, and staffed by an experienced and stable work force. The company occupies owned premises of some 27,000 sq ft located on 16 acres of industrial land in Stratford, Ontario.

- Quality Assurance - Consistent conformance to specifications is assured by the company's quality systems which conform presently to the requirements of AQAP-4 and are progressing towards AQAP-1.

- Project Management - Effective management of development and production start-up programs is achieved through formal project planning and control methods, facilitated by computer-based critical path techniques.

AVERAGE WORK FORCE: Technical - 11
Managerial/Supervisory - 11
Skilled - 13
Others - 58

GROSS SALES: 1988 - \$5.5M
1989 - \$5.9M

PLANT SIZE: 27,000 sq ft

EXPERIENCE: Novatronics' primary markets are the aircraft, aerospace, and defence industries in North America. Secondary markets are the aircraft, aerospace, and defence industries in Europe. Tertiary markets are the business machines and industrial control sectors, again predominantly in North America with small offshore sales. Major customers include Boeing, Bendix, Canadair, deHavilland, Fairchild, Gull, IBM, and Sperry.

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ODYSSEY RESEARCH ASSOCIATES

ADDRESS: 265 Carling Ave, Suite 506
Ottawa, Ontario
Canada K1S 2E1

CONTACT. Mr Dan Craigen, Director Ottawa Operations
Tel: (613) 238-7900

KEYWORDS. Artificial Intelligence, Automated Deduction, Automatic Induction; Automated Reasoning; Automated Theorem Proving; Computer Security, Formal Specification, Verification of Software, Higher Order Language, Computer Software Verification, Logic of Programs, Soundness, Rewrite Rules, Program Verification.

HISTORY: Odyssey Research Associates is a Canadian subsidiary of Odyssey Research Associates Limited (ORA), Ithaca, New York. Prior to May 1989, members of the group were employees of the Ottawa Trusted Systems Group of I P Sharp Associates Limited (IPSA), with corporate headquarters located in Toronto. IPSA was purchased by Reuters in 1987. Due to the changes in business directions at IPSA,

the Ottawa Trusted Systems Group departed from IPSA and joined ORA, an organization which is more closely allied to their business and research interests.

CAPABILITY. The primary focus of Odyssey Research Associates, Ottawa office, has been formal methods and, in particular, the development of mathematically sound automated tools that support the application of formal methods to the development of critical systems. This work has spanned a wide spectrum of research fields, including automated deduction, artificial intelligence, language design, formal semantics, security, and critical software and methods for formally specifying and proving programs and systems.

AVERAGE WORK FORCE: 7 (Ottawa office)
60 (Ithaca, NY)

GROSS SALES 1989 - \$1.2M (Ottawa office)

PLANT SIZE 2,900 sq ft (Ottawa office)

EQUIPMENT. The hardware resources available for the Ottawa office include a PC AT clone, two VAX 750s, four Symbolics Lisp machines, and a Sun machine. The software resources include Kyoto Common Lisp, VAX/VMS, Berkeley Unix, and the Genera system. All the machines reside on an ethernet; one VAX is also connected to internet.

EXPERIENCE. The Ottawa office of Odyssey Research Associates is currently involved in projects related to EVES (Environment for Verifying and Evaluating Software), a program verification system. The current sponsors of EVES are the Canadian Department of National Defence and the communications security establishment. The United States Navy has also cosponsored EVES development.

The development of EVES has two major streams: the design of a specification and implementation language (with supporting mathematics), called Verdi, and the implementation of a theorem prover, called NEVER.

The first phase of research and development was completed in 1987. This resulted in the m-EVES system, which consists of the language m-Verdi, an m-Verdi compiler, and the m-NEVER theorem prover.

Future work will be directed at increasing the expressibility of the logic and Verdi, the writing of a compiler for Verdi, the continuing evolution of the interface, the porting of the system to other hardware bases, and the continued application of the system to various examples.

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OERLIKON AEROSPACE Inc

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Saint-Jean-sur-Richelieu, Quebec
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Ottawa Office:
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130 Albert Street
Ottawa, Ontario
Canada K1P 5G4

CONTACT *Saint Jean-sur-Richelieu Facility*
Mr Glen Decker, Vice President Business Development
Tel: (514) 358-2000
Fax: (514) 358-1744

Ottawa Office
Mr Wayne Johnson, Manager Corporate Affairs
Tel: (613) 235-0324
Fax: (613) 235-1386

KEYWORDS: Aeronautical Engineering; Hydraulic Engineering; Astronautics, Environment, Space; Technical Writing Services; Translation Services; Fire Control Systems; Optical Sighting and Ranging Equipment; Sensors; Missile Guidance Systems; Fuses; Space Vehicle Electronics; Remote Control Systems; Training Aids; Computer Software;

Artificial Intelligence, Data Communications, Telecommunications, Design Engineering, Consulting Services, Statistical Analysis, Models and Simulations; Robotics; Artificial Vision Systems; Integrated Circuit Systems; Missile and Munitions Technology; Electro-Optics and Laser Technology, Radar Defense Systems.

HISTORY. Oerlikon Aerospace Inc (OA) is a Canadian company which commenced operations in 1986 following the award of the CF LLAD contract to Oerlikon-Buehrle of Zurich, Switzerland. Oerlikon Aerospace Inc has established itself as a major North American systems house providing fully integrated design, engineering, assembly, test, production, and logistics support for defense, aerospace, and other high-technology systems.

CAPABILITY: Oerlikon Aerospace Inc is a high-technology systems engineering company that designs, engineers, integrates, and tests advanced electronics, aerospace, defense, and other systems. In addition, it provides full life cycle support and project management services internationally in areas such as integration and testing, integrated logistics support, calibration testing, program management, configuration management, project engineering, operational analyses, and industrial benefits management. OA's capabilities allow for diversification into other technology-driven sectors such as space, environment, control systems, and communications.

AVERAGE WORK FORCE: PhDs - 7
Engineers and Scientists - 120
Other - 577

GROSS SALES. 1988 - \$25.0M
1989 - \$79.0M

PLANT SIZE: 32,000 sq m on a 40 hectare site

EQUIPMENT. *Electro-optical laboratory* used to assemble, test, and trouble shoot sensitive electro-optical devices and collimator systems, temperature and humidity controlled and pressurized; Class 10,000 (100 parts per million). *Mechanical lab* for all types of mechanical work within prototype or first unit integration projects. *Outside test facilities*, including an 800 meter track, for road and vehicle vibration tests, a surveyed target board for navigation systems alignment; a 6-degree slope for system function testing, a radar target simulator (up to ten targets) for doppler and non-doppler radars, boresight target boards for optical alignment of systems, testing and detection and decoding of CO₂ laser signals, and a flight target simulator for target tracking testing using visible or infrared sourcing, with 360-degree rotation simulating aircraft speeds ranging from Mach 0.3 to 3.5. *Optical test bench (OTB)* (patent pending) for aligning, calibrating, and evaluating complex electro-optical assemblies; testing of boresights and sensor tracking capabilities, and power and coding of lasers. *Software support center*, including a shielded room, emulators, simulators, and configuration management software for the development of embedded software, software maintenance, training, and testing.

Other equipment includes MRP, CINCOM, CADAM 2D & 3D, VAX, IMB, AND IMB-PC hardware and software; various processors, compilers, and programming tools; shielded room; TEMPEST facilities; Interleaf; and LOGOS automated translation software.

EXPERIENCE: OA's experience includes Low Level Air Defense (LLAD) system for the Canadian Government which includes gun, radar, and missile systems; Forward Area Air Defense (FFAD-LOS) program for the US Army; Strategic Technologies Enhanced Automation and Robotics (STEAR) contract, robotic vision technology study contract, and numerous studies relating to defense and space-related technologies.

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ONTARIO HYDRO (Research Division)

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Toronto, Ontario
Canada M8Z 5S4

CONTACT. Dr G R Floyd, Supervisor, Research Business Relations
Tel: (416) 231-4111, X6322
Fax: (416) 231-9679

KEYWORDS: Alternate Fuels Research; Analytic Services; Atmospheric Research; Biological Research; Biomass; Combustion Research; Concrete Technology; Corrosion Science; Distributor; Research; Electronics Research; Electrotechnology Research; Energy Conversion; Engineering Services; Emission Control; Environmental Assessment and Qualification; Failure Analysis; Fracture Mechanics; Geotechnical Engineering; High Voltage Engineering; Instrumentation; Materials Sciences; Non-Destructive Testing; Nuclear Engineering; Nuclear Waste Management; Neutron Activation Analysis; Operations Research and Statistics; Organic Materials Research; Physical Metallurgy; Pollution Control; Power Systems; Process Metallurgy; Rock Sciences; Soil Sciences; Structural Integrity; Thermofluids and Tribology Research; Transmission Research; Tritium Technology; Welding Technology.

HISTORY. Ontario Hydro was established by provincial legislation in 1906 and has the authority to generate, buy, and distribute electricity throughout Ontario. The Research Division, which occupies the Dobson Research Laboratory, was founded in 1912 and is one of the oldest and largest utility research laboratories on this continent. Ontario Hydro is a financially self-sustaining Crown Corporation that derives no revenue from taxes.

CAPABILITY. The Research Division of Ontario Hydro is a fully integrated facility with a broad range of capabilities in research, development, and testing. Extensive experience with solving utility-related problems has produced a staff with expertise in such areas as materials science, high voltage science and engineering, concrete technology, organic and inorganic chemistry, biology, and geotechnical engineering to name a few. The keyword list gives a more detailed account of the division's areas of expertise. Many of the techniques and skills developed at the Research Division, while developed in support of the utility, are applicable in other areas.

AVERAGE WORK FORCE. Research Division.
Engineers, Physicists, etc - 294
Technicians & Technologists - 278
Support Staff - 70

GROSS SALES: 1988 - \$68.3M
1989 - \$74.2M

PLANT SIZE. 43,000 sq meters Kipling Complex (plus other test sites)

EQUIPMENT. The following is a list of the major physical facilities. The Research Division also has various sophisticated test and measurement instruments in general use in its laboratories.

- Electrical/Electronic - High voltage laboratory (including winter weather chamber), high current laboratory, industrial processes laboratory (high frequency power, impulse power, high temperature plasma), electromagnetic laboratory, electronics development laboratory, mobile cable fault location laboratory, mobile high potential test facility, SF6 substation (full scale), and battery laboratory.
- Mechanical/Metallurgical/Structural - Nuclear process components test facility (full-scale primary heat transport pump test set up to 12,600 hp), seismic laboratory, anechoic chamber, conductor stress-strain laboratory, heavy mechanical test laboratory, conductor dynamics full-scale test facility, non-destructive evaluation center, welding laboratory, metallographic analysis laboratory, corrosion testing autoclaves and loops, electric furnace facility, scanning and transmission electron microscopes, tritium laboratory, and burst test facility (full-scale pressure test on pipes, pressure vessels, etc.).
- Chemical - Analytical chemistry laboratory, radioactive materials laboratory, surface analysis facility, oil laboratory, combustion research facility, corrosion research facility, and PCB analysis facility, and radiography and thermography facility.
- Environmental - Mobile environmental monitoring facility, environmental chamber, LIDAR and other laser systems, and micrometeorological instrumentation.

- Civil - Soil, rock, and concrete research and testing laboratories (various strength testing equipment); freeze-thaw testing of concrete; petrographic analysis of geological materials; pore size distribution; and surface area determination of porous media.

EXPERIENCE. In the past, the Research Division has won many research and development contracts from the Canadian Electrical Association, the Electric Power Research Institute, the Canadian Federal Government, and other public and private organizations, both domestic and foreign.

REVISED: Mar 90

OPTO-ELECTRONICS Inc

ADDRESS 2538 Speers Road, Units 8, 9, & 10
Oakville, Ontario
Canada L6L 5K9

CONTACT. Dr B K Garside, President
Tel (416) 827-6214
Fax: (416) 827-6216

KEYWORDS Detectors, Electro Optics, Fast Optical Detection, Fast Optical Source, Fiber Dispersion Measurement, Fiber Optic Instruments, IR Detectors, IR Sources, Industrial Control Instrumentation, Infrared Diode Lasers, Infrared Instrumentation, Instrumentation, Laser Diodes, Fiber Optic Test/Measurement, Photodetectors, Reflectometer (Optical Time Domain), Sensors (Fiberoptic)

HISTORY Opto-Electronics is a high-technology company incorporated in late 1976 with a subsidiary in the US (775 Main St, Unit #202, Buffalo, New York 14202, Telephone 216-856-1322). The company was formed with the primary goal of carrying out research, development, manufacturing, and marketing of high technology electro-optical components, devices, and instruments.

CAPABILITY: Opto-Electronics fields of expertise lie in the areas of industrial fiber-optic-based control instrumentation, fiber optic systems, fast optical sources and detectors, and laser devices, sensors and transducers. Past year activities include new product development and manufacturing as well as research on special ultra-high-speed photodetectors, ultra-high-speed diode laser light sources, millimeter resolution optical time domain reflectors (OTDR), and a line of industrial fiber-optical test and measurement instruments, controllers, and sensors. Current research projects include ultra-fast photodetectors, ultra-fast laser diode sources, photon counting for fiber test instrumentation, passive waveguide splitters and combiners, fiber-based liquid sensors, and through-the-atmosphere displacement measurement systems.

AVERAGE WORK FORCE Scientists, Engs, & Techs - 16
Others - 4

GROSS SALES: 1988 - \$1.6M
1989 - \$2.1M

PLANT SIZE: 12,000 sq ft

EQUIPMENT OEI's facilities include a machine shop, assembly room, dark room, and circuit etching, electronics test, and optics test areas, stock room, and shipping and receiving rooms. Eight people are currently assigned to manufacturing and sales. Their R&D facility consists of lasers, optics, electronics and optics design, electronic assembly areas, materials processing rooms, areas of microscope and spectral analysis, vacuum work and measurement, and an integrated optics facility. Also included are special rooms for furnace work, machining and modeling, and a library.

Major equipment includes high vacuum evaporator, electron microscope, cryogenic, electrical, and optical facilities, picosecond fiber optics test facility, spectrophotometer, ellipsometer, diffusion furnace, vacuum furnace; optical microscopes; multiple beam interferometer; electrometers, oscilloscopes, and other associated instruments.

EXPERIENCE OEI's R&D contract experience has, for the most part, been with the Canadian Government, although they have recently carried out contractual work on liquid leak fiber optic sensors for NASA. Most products are exported. They have expressed interest in doing R&D contract business with the USAF; a significant amount of OEI's commercial business is with USAF prime contractors.

REVISED: Mar 90

OPTOTEK Ltd

ADDRESS: 62 Steacie Drive
Kanata, Ontario
Canada K2K 2A9

CONTACT: Dr David I Kennedy, President
Tel: (613) 591-0336
Fax: (613) 591-0584

KEYWORDS: Cockpit Displays, Data Annotation Displays, Displays, Electronic Test Equipment, Flat Panel Displays, IR Detectors, Infrared Instrumentation, Integrated High Density LED Displays, LED Arrays, LED Materials, Multicolor LED Displays, Printheads (LED), Semiconductors, Solid State Devices, Solid State Recording Heads, GaAs MMICs, MMICs, Microwave Analysis & Design Software, Software (Microwave Analysis & Design).

HISTORY Optotek Ltd is a high-technology company with no other divisions in Canada or the US. Optotek was incorporated in Oct 77.

CAPABILITY Optotek's capabilities include (1) Development and manufacture of LED materials and devices based on Group III-V, (2) design and manufacture of custom LED arrays for military and industrial applications, (3) design and manufacture of display-related electronic subsystems and test equipment, (4) design and manufacture of Gallium Arsenide monolithic microwave integrated circuits, (5) design and manufacture of infrared photodetector arrays (Cadmium Mercury Telluride), and (6) microwave and monolithic integrated circuit analysis and design software.

AVERAGE WORK FORCE: PhDs - 2
Engineers - 10

GROSS SALES: No data.

PLANT SIZE: 37,000 sq ft

EQUIPMENT: Optotek has a full complement of semiconductor processing and test equipment.

EXPERIENCE: Optotek has experience with the USAF, USN and NASA. They are interested in continuing their business with the DOD and NASA. Past contracts have been in the LED materials, devices, and displays areas and GaAs MMICs. Principal programs with the USAF have been the Multimode Matrix LED Display, the Video Flat-Panel LED Display, and the development of Multicolor LED Displays. The USN programs include manufacturing technology for advanced solid-state data annotation displays and a production program involving the RF-4 and P3 reconnaissance systems. The company is working cooperatively with US prime contractors involved in MMIC components and transmit/receive modules for space-based radar.

REVISED: Mar 90

ORACLE TELECOMPUTING Inc

ADDRESS: 25 Industrial Avenue
Carleton Place, Ontario
Canada K7C 3V7

CONTACT: Mr Jim Harvey, President
Tel: (613) 257-4425
Fax: (613) 257-7764

KEYWORDS: ATC, Air Defense Display, Aviation Briefing, Flight Data Processing, Meteorological Information Handling, Satellite Information Distribution, Message Switching, Airport Status, Voice Switching, Cost Allocation, NOTAM Handling, Simulators (ATC), Flight Plan Handling.

HISTORY. Oracle Telecomputing Inc is a Canadian owned, high-technology company founded in 1980. It initially specialized in consulting in telecomputing (i.e., the integration of telecommunications and computing). In 1983 it diversified into custom turnkey system design, implementation, and production.

CAPABILITY: Oracle Telecomputing Inc is primarily involved in the design, implementation, and production of data handling/processing systems for aviation, weather, and defense applications.

Oracle telecomputing makes extensive use of readily available and proven off-the-shelf hardware and software. It then designs and produces custom hardware and software to tie all elements together as a custom turnkey system.

Oracle Telecomputing's weather, NOTAM, and flight planning systems are currently in use with Transport Canada, Environment Canada, the Canadian Air Force (at their two air bases in Germany) and the US Air Force (at each of their Regional Operations Control Centers). Transport Canada is installing an Oracle Telecomputing-designed system in all of its 107 Flight Service Stations.

An Oracle Telecomputing air traffic control system is in use with the Canadian Department of National Defence in seven locations across Canada. This system includes a radar simulator with pseudo pilot control for training.

An Oracle Telecomputing satellite information distribution system is being used in 20 locations by Environment Canada.

Oracle Telecomputing message switching systems are being used by Transport Canada (in the Gander International Area Control Centre) and the Bank of China.

Oracle Telecomputing provides full life-cycle support services. These services range from feasibility studies at the front-end all the way through specification, design, implementation, deployment, training, documentation, hardware and software support, repair and overhaul, and life-extension (e.g., the design of form-fit and function-replacement elements).

Software languages used include Ada, C, Pascal, and Assembler. Software quality assurance is compliant with AQAP-13 with adherence to DOD2167/DOD2167A. Hardware quality assurance is compliant with AQAP-4.

AVERAGE WORK FORCE: PhD - 1
MSc - 2
BSc/BA - 3
Technologists - 6
Support - 3

GROSS SALES: 1988 - \$1.0M
1989 - \$1.2M

PLANT SIZE: 6,000 sq ft

EQUIPMENT. Complete software and hardware design, development, production, and support facilities (computers, software tools, debuggers, serial data analyzers, simulators, schematic capture, PCB board design and routing, logic analyzers, oscilloscopes, function generators, etc.).

EXPERIENCE. Present customers include various departments in the Canadian and US governments including Transport Canada, Environment Canada, Department of National Defence, and US Air Force.

REVISED: Mar 90

PARAMAX ELECTRONICS Inc

ADDRESS: 6111 Royalmount Avenue
Montreal, Quebec
Canada H4P 1K6

CONTACT. Mr Jack Henry, Director, Marketing
Tel: (514) 340-8310
Fax: (514) 340-8318

KEYWORDS: Electronic Systems Design; Naval Combat Systems; Program Management; Systems Integration; Training.

HISTORY. Paramax Electronics Inc is a wholly-owned subsidiary of Unisys Corporation in Canada. The company was created following the granting by the Canadian Government of a \$2.6 billion contract to the St John Shipbuilding/Paramax team for the construction of six Canadian Patrol Frigates. Paramax's contract for design, integration, testing, and installation of the combat systems and other electronics on the first six frigates is valued at \$1.25 billion. The company has also recently been awarded an additional contract for electronic systems work on a second group of six frigates. This contract, running to 1997, represents a further \$1.25 billion to Paramax. Paramax is also presently involved in contract proposals for systems integration work on up to 45 new shipboard helicopters for the Canadian Forces.

CAPABILITY. Paramax is in the business of electronic systems management. It is a disciplined, systematic process which begins with the analysis of a complex requirement, examines alternatives, selects candidate approaches, synthesizes the best answer, and then implements the proper solution.

Paramax engineers have developed independent expertise in systems integration and management and are now pursuing new large-scale program management business worldwide.

Training Canadian Navy crews is also one of Paramax's immediate responsibilities. The realistic physical environment created in the 16,000 sq ft radio frequency (RF) shielded room within the Combat System Test and Support Facility allows naval personnel to test and familiarize themselves in the use of the system over an extended period of time in life-size detailed mock-ups of the frigate's bridge, operations room, and other ship's space.

The significant advantage of the land-based test concept is that the entire combat system, including the computer software, can be tested to its operational limits through simulation of realistic and repeatable combat scenarios prior to installation aboard ship. Similar testing is not feasible at sea, except in wartime, because of costs.

AVERAGE WORK FORCE: 800 specialists in electrical, electronic, and mechanical engineering and computer sciences.

GROSS SALES: 1988 - \$250M
1989 - \$250M

EQUIPMENT. Combat System Test and Support Facility (CSTSF), Avionics Systems Integration Laboratory (ASIL), Ada Software Development Center.

EXPERIENCE: Saint John Shipbuilding Ltd, E H Industries (Canada) Inc, and Litton Systems.

PLANT SIZE: 160,000 sq ft

REVISED: Mar 90

PATLON AIRCRAFT & INDUSTRIES Ltd

ADDRESS: 5502 Timberlea Blvd
Mississauga, Ontario
Canada L4W 2T7

CONTACT. Mr P B Mann, President
Tel: (416) 624-5572
Fax: (416) 624-0975

KEYWORDS. Aircraft Parts, Library (Aircraft Parts), Parts (Aircraft), Reference Library (Aircraft Parts).

HISTORY. Patlon Aircraft & Industries Ltd has been in business for 35 years and is 100% Canadian owned. It was originally located at 74 Six Point Road, but moved to a much larger facility at its present address. It has a wholly owned subsidiary located in Miami, Florida, and a branch office in Ottawa.

CAPABILITY: Patlon, as an engineering sales organization, has provided valuable service to the Canadian government, specifically the Department of National Defence. Patlon has, in conjunction with its principals, designed and supplied mobile electronic weighing systems for the CF18, electrical connector crimping tool kits for the CP140 and CF18 maintenance facilities, and supplied the static facilities, army vehicles, and supply depots. Patlon supplied noise/shock attenuation hardware to the Canadian Navy, and this equipment is approved for use on the Canadian Patrol Frigate program. All frigates will be equipped with Patlon outboard bearings. Patlon also designed and supplied aircraft and ground support equipment cleaning machines.

Patlon maintains one of the largest master reference libraries in Canada which includes most of the military vehicles and equipment purchased in the free world. This capability enables us to cross reference products replacing specified materials and equipment with qualified products from multiple sources, usually at a lower cost. Patlon has been particularly successful in this area with the Canadian military, airframe, and engine repair and overhaul depots.

Its selling procedure includes meeting with management, procurement, engineering, sales, service, and manufacturing personnel, depending upon the product and customer requirements. With its knowledge of the industry and personnel involved, it has the opportunity of discussing projects at the drawing board stage, and in many cases, has been successful in having its equipment specified.

To summarize, Patlon provides both spare support service as well as product support at the original equipment manufacturer level.

AVERAGE WORK FORCE: Management - 5
Support Staff - 9
Sales - 14

GROSS SALES: No data.

PLANT SIZE: 6,000 sq ft (Toronto, Canada)
2,500 sq ft (Miami, Florida)
1,000 sq ft (Ottawa, Canada)

EQUIPMENT: Patlon is equipped with all the required communications equipment to conduct business around the world.

EXPERIENCE: Patlon provides the services mentioned above to several other countries. The list of foreign countries which it has sold to includes Germany, Turkey, Australia, Denmark, Indonesia, the US, and many South and Central American countries. The Miami office of Patlon, which was opened in January 1980, has vastly improved Patlon's ability to service both the South and Central American countries.

REVISED: Mar 90

PELORUS NAVIGATION SYSTEMS Inc

ADDRESS: #202 - 575 Palmer Road N E
Calgary, Alberta
Canada T2E 7G4

CONTACT: Mr Don Sinclair, Vice President, Marketing
Tel: (403) 250-9377
Fax: (403) 291-9123

KEYWORDS. Distance Measuring, MLS, Automated Weather Observation; Avionics, Meteorological Stations; Navigation Systems; Ice Detection; Weather Forecasting; Direction Finder

HISTORY. Pelorus Navigation Systems Inc is a Canadian-owned company started in 1982 as a navigation system specialist in the aviation industry. The company headquarters are in Calgary with sales offices in Toronto, Ontario; and Tucson, AZ.

CAPABILITY. Pelorus supplies, installs, monitors and maintains ground-based aids to aircraft navigation. These systems include MLS (microwave landing systems), DME (distance measuring equipment), AWOS (automatic weather reporting systems), SCAN (runway/roadway surface weather analyzing and ice detection equipment), NDB (non directional beacons), VHF DF (direction finding equipment), RVR (runway visual range) equipment, and subcontract ability of RF manufacturing in the microwave band. Pelorus systems are installed at over 70 regional airports, as well as at Vancouver, Calgary, Winnipeg, Halifax, and Dorval International Airports.

The company is a manufacturer of radio navigational and meteorological equipment, and as well, supplies products through long-term exclusive distributor agreements with leading manufacturers. Engineering surveys and consulting are also capabilities.

Pelorus has an active R&D program. Currently under development is a low-cost microwave landing system avionics receiver, designed for general aviation operators. The receiver is a state-of-the-art design based on very large scale integration (VLSI) technology.

AVERAGE WORK FORCE. MBA/B Communications - 2
Engineers/Technicians - 15
Others - 18

GROSS SALES: 1988 - \$2.4M
1989 - \$2.5M

PLANT SIZE: 10,000 sq ft

EQUIPMENT: Pelorus' electronic test equipment includes: oscilloscopes, spectrum analyzers, watt meters, power meters, and meteorological devices.

EXPERIENCE: Pelorus' present customers include Transport Canada, Province of Alberta, Canadian Coast Guard, Petro Canada, Shell Canada Resources, Home Oil Co., Canterra Energy Co., municipal airports in Canada, governments of Korea, Thailand, Ireland, as well as municipal airports in Germany, Sweden, Holland, and Australia.

REVISED: Mar 90

PLANE AVIONIC ENTERPRISES Inc

ADDRESS: 4314 Stella Crescent
G'oucester, Ontario
Canada K1J 8T7

CONTACT: Mr J E Gibbs, President
Tel: (613) 749-7466
Fax: (613) 731-9782

KEYWORDS Aircraft Conversions, Aircraft Systems Installation Design, Aircraft Systems Integration, Aircraft Systems Certification, Avionics Testing; Consultants (Engineering); Consultants (Management); Consultants (Reliability Analysis), Consultants (Telecommunications).

HISTORY: Plane Avionic Enterprises Inc (PAEI) is a 100% Canadian-owned company specializing in aircraft avionics systems integration, installation, design, design studies, and program management. PAEI was formed early in 1988 by John E. Gibbs as president. In its first year of operation, PAEI has contracted business in excess of \$1.2 million. The company's goal is to achieve sales in excess of \$5.0 million during the early 1990s. Currently the company employs six qualified aeronautical engineers/designers full time with part-time assistance as required by another four engineers.

CAPABILITY: PAEI has assembled a dedicated professional team of engineers and designers who have the capability to undertake complete aircraft design tasks. These tasks can range from simple, single-system installations to multi-system integration installation. This team can complete these tasks without the usual necessary supervision at the work level, thus relieving the client management of the day-to-day work worries.

PAEI has proven its ability to operate in this autonomous manner. The preliminary design for the installation of a complete EW suite into a CL600 Challenger aircraft has been successfully completed.

The installation design covers the full spectrum from engineering conception through design at Level II to structural, aerodynamic, and damage tolerance analyses.

AVERAGE WORK FORCE: Engs - 4
Designers - 2
Drafters - 1

GROSS SALES: 1988 - \$450K
1989 - \$850K

PLANT SIZE: No data.

EQUIPMENT. Complete aircraft design office capable of manual drafting and computer aided design facility. Computerized stress and damage tolerant analysis. Word processing.

EXPERIENCE. The company's customers include Lockheed Canada, who is prime contractor for DND, and Revenue Canada for technical audits.

REVISED: Mar 90

PLASTAL Inc

ADDRESS: 840 Vadnais Street
Granby, Quebec
Canada J2J 1A7

CONTACT: Mr Michael Artus, President
Tel: (514) 378-8439
Fax: (514) 378-8699

KEYWORDS: Composite Components; Composite/Fiberglass Components; Plastic Fabrication; Plastic Molding; Antennas (Ground Station); Canopies; Transparencies; Aircraft Transparencies.

HISTORY. Plastal Inc is a wholly owned subsidiary of Avcorp Industries Inc, Montreal, Quebec. The company was formed in 1952 to produce acrylic cockpit canopies for the North American F-86 Sabrejet fighter.

CAPABILITY: Plastal Inc is a prime producer of specialized plastic and composite components using materials and fabrication techniques that reflect the latest advances in technology.

The company's products include: flight simulator bodies, surveillance aircraft nose and tail cones, fighter aircraft canopies, passenger cabin windows, cockpit glare shields, fairings, moldings, doors, wheel well bins, aircraft ducting, satellite earth station and ship antennae, wingtip lenses, window surrounds, interior paneling and more.

AVERAGE WORK FORCE. Engineers - 1
QC - 4
Staff - 10
Others - 65

GROSS SALES. 1988 - \$3.5M
1989 - \$4.8M

PLANT SIZE: 40,000 sq ft

EQUIPMENT: Plastal Inc's equipment includes composite curing ovens, an autoclave, and an environmentally-controlled composite lay-up facility.

EXPERIENCE. Plastal Inc's customers include McDonnell Douglas Canada Ltd, The Boeing Co, British Aerospace PLC, Canadair Ltd, Innotec Aviation Enterprises Ltd, CAE Industries Ltd, and Pratt & Whitney Canada Ltd.

REVISED: Mar 90

POSITRON INDUSTRIES Inc

ADDRESS: 5101 Buchan Street
Montreal, Quebec
Canada H4P 2R9

CONTACT: Mr Nick Koloshuk, Vice President, Sales and Marketing
Tel: (514) 345-2200
Fax: (514) 731-8662

KEYWORDS. Telecommunications Products, Trading Turrets, Telephone/Radio Communications Consoles, Emergency Response Equipment (E-911); High Voltage Protection Products; Teleline Isolator, Mutual Drainage Reactor; Teleprotection; Lightning Arresters; Fiberline Isolator, Ground-Air-Ground, Radio Identifier, Electromagnetic Dosimeter, Surface Mount Technology.

HISTORY. Positron is a privately-owned company founded in 1970. Positron has been designing and manufacturing state-of-the-art telecommunications equipment since 1970. The corporate headquarters and manufacturing plant are located in Montreal. Positron maintains general sales and support offices in New York City, Chicago, and Toronto.

CAPABILITY: Positron is primarily involved in the design and manufacture of high-tech telecommunications products and has been heavily involved in the development of custom projects related to radio communications for the military (NORAD, North Warning System). Positron's capabilities cover the broad areas of engineering including software, hardware, mechanical engineering, CAD/CAE, and SMT design; manufacturing; production; quality assurance; documentation; and training.

AVERAGE WORK FORCE: Engs - 50
Others - 300

GROSS SALES: 1988 - \$28M
1989 - \$30M

PLANT SIZE: 180,000 sq ft

EQUIPMENT: Complete electronics production facility; complete SMT manufacturing facility, CAD/CAE systems, ATE, in-house computer systems.

EXPERIENCE. Present customers include banks, power utilities, government (Canadian, US, and foreign), brokerage houses, RBOC, military (Canadian and US), and overseas companies (UK, Hong Kong, Australia, New Zealand, Kuwait, and Panama).

REVISED: Mar 90

PRATT & WHITNEY CANADA Ltd

ADDRESS: 1000 Marie Victorin
Longueuil, Quebec
Canada J4G 1A1

CONTACT Mr S Monaghan, Chief R&D Support
Tel: (514) 647-7557
Fax: (514) 647-7652

KEYWORDS. Alternate Fuels Research, Auxiliary Power Units, Combustion Research, Compressors (GT Engines), Engine Components, Engine Emission Research, Engine Research, Engine Systems, Engines; Fuel Research; Fuel Systems Research; Gas Turbine Engines; Helicopter Subsystems, R&O (Engines), Roller Bearings, Small Gas Turbine Engines, Test Instrumentation, Testing/Test Equipment, Turbine Engines.

HISTORY Established in 1928 as a Canadian center for the overhaul of Pratt & Whitney Aircraft radial piston engines, Pratt & Whitney Canada Ltd (P&WC) took over full responsibility for this function prior to moving into small gas turbine development and production. They are a wholly owned subsidiary of the Pratt & Whitney Aircraft Group, a division of United Technologies Corporation.

CAPABILITY. P&WC has the mandate to develop and produce all small gas turbine engines typically for general aviation, commuter, paramilitary and for aircraft auxiliary power units. Their primary business areas are:

- Small gas turbine engine development
- Small gas turbine engine production
- Small gas turbine engine oriented research

The development of gas turbine engines at P&WC started in the late 1950s with the early PT6. This turboprop engine was introduced to the commercial market in 1963. The military designation for this engine is the T74 CP 701. In 1979, the development started on the PW100 turboprop engine. This fuel efficient engine is used primarily in commuter and short-haul aircraft.

The JT15D turbofan engine was introduced in 1967. It is the power plant of the Cessna Citation series of corporate jets, and the Beech Diamond aircraft. P&WC has also developed a twin turboshaft engine for helicopter use. These are designated the PT6T-3 and -6 series (military designation is T400-CP-400, WV-402). Other engine families are also under development which include a series of small turbo shaft engines, a new fan engine and auxiliary power units.

To date, the company has delivered over 32,000 engines for the world market.

AVERAGE WORK FORCE Company Total - 10,000
R&D Center - 2,232

GROSS SALES: 1988 - \$1,053M
1989 - \$1,342M

EQUIPMENT: Equipment includes extensive manufacturing and R&D equipment and facilities for all aspects of small aviation gas turbines - test cells, spin pits, fatigue test facilities, metallurgical test facilities, gear test facilities, strain gauging/thermocouple applications, photoelasticity, acoustics, etc.

EXPERIENCE: P&WC has had experience with the following organizations:

- United States Air Force - (1) Research on High DN Value Roller Bearings - a program to determine the influence of geometric variable etc., on small high-speed roller bearings (carried out as a shared development program), and (2) Alternate Fuels Combustion Research - an experimental study of the effects of alternate jet fuels on small gas turbine combustion systems (also carried out as a shared development program).
- United States Army - (1) Subcontractor in Cooled Radial Turbine Program to Pratt & Whitney, Government Products Division (GPD) (1969-1971). Pratt & Whitney Canada Ltd was responsible for the Aerodynamic design and participated in the structural analysis and mechanical design of the turbine; (2) Consultant to P&W (GPD), on ST9 1500 horsepower demonstrator program for new US Army helicopter engine - first stage was scaled P&WC research rotor and second stage was centrifugal compressor (1966-1969); (3) Consultant to P&W (GPD), for the demonstration of a 10.1 Pressure Ratio single centrifugal compressor - P&WC provided data from previous in-house demonstrations of 10:1 Pressure Ratio Compressors carried in 1967 & 1970 (1970-1972); and (4) Contracted with the US Army at Ft Eustis for an advanced 15.1 Pressure Ratio Single Centrifugal Compressor concluding in 1989. Compressor performance exceeded all the original program goals.
- United States Navy - (1) P&WC was a subcontractor to P&W, Commercial Products Division (CPD), on a demonstration of a regenerative, small turboprop engine based on the PT6 - P&W designed the regenerator, while P&WC designed the ducting, organized hardware fabrication, and demonstrated the concept (1964-1966), (2) P&WC won a contract to provide a twinned helicopter engine (T400/402 Twin Pac R) to the US Navy for Bell Aerospace helicopters where 1032 units have been supplied - also 2218 units in a civil version (PT6T3/6) have been produced to date and (3) P&WC has also performed as a subcontractor to P&W, CPD, on a demonstration of single crystal turbine blades for gas turbine operation.

- Environmental Protection Agency – (1) P&WC carried out a combustion research program for small, single can, highly loaded combustors for automotive application with good performance and low emissions (1973-1974); (2) P&WC was subcontractor to United Technologies Research Center (UTRC) on a study of the automotive application of gas turbines – carried out a series of cycle studies and supported experimental work on combustion (early 1970s); and (3) P&WC also supported the Environmental Protection Agency (EPA) (Triangle Park) on studies of the carcinogenic effect of small gas turbine emissions (1977-1978).

- National Aeronautical Space Administration (NASA) – (1) P&WC was subcontractor to P&W (CPD), on a turbofan core noise program at NASA Ames carried out on a NASA owned P&WC JT15D engine – P&WC designed and fabricated an alternate fan core stator to increase the axial spacing between rotor and stator, and the number of stator vanes (1977); (2) P&WC was subcontractor to P&W (CPD), on a program of nose cone telemetry for NASA Lewis Research Center as applied to a NASA JT15D turbofan – P&WC designed a transmitter to operate within the nose of a JT15D to study the difference between ground and flight noise measurements (1978-1980); (3) P&WC was also subcontractor to P&W (CPD), on a program to supply NASA Langley with copies of the telemetry units from item #2 for flight use with stringent manufacturing requirements (1979-1980), and (4) P&WC was also subcontractor to United Technologies Research Center on a Combustor soot program – all combustor hardware was designed and fabricated by P&WC, while United Technologies Research Center assembled the rig and carried out all testing (1980-1981).

REVISED: Mar 90

PRICE & KNOTT MANUFACTURING COMPANY Ltd

ADDRESS: 655 Finley Avenue
Ajax, Ontario
Canada L1S 3V3

CONTACT: Mr Paul Laureysse, Manager, Sales & Marketing
Tel: (416) 683-7501
Fax: (416) 427-3038

KEYWORDS: CNC Punching; CNC Forming; CNC Milling; CNC Turning, Welding, Build-To-Print; Machining; Precision Machining; Components (Mechanical).

HISTORY: Price & Knott was formed in 1954 to supply job shop expertise to local aerospace and defense companies. The company is currently operating as a closely held corporation in the province of Ontario.

CAPABILITY: Price & Knott is currently involved in build-to-print mechanical assemblies and components using the facilities of their precision sheet metal and machining departments. The facility is supported by, in house, welders approved to weld per MIL-W-8604 and MIL-W-8611 specifications. In addition, the company has a complete assembly area for part markings, of all description, and hardware assembly. Their expertise in finishing to MIL STDs includes chromate conversion to MIL-C-5541 and passivating to QQP-35 Type 1 to 6. The entire operation has been certified to AQAP 4 and MIL-I-45208A quality standards by numerous prime contractors and the Canadian Department of National Defence.

AVERAGE WORK FORCE: Quality Control – 3
Engineering – 4
Others – 56

GROSS SALES: 1988 – \$5.8M
1989 – \$5.4M

PLANT SIZE: 62,000 sq ft

EQUIPMENT: Complete state-of-the-art equipment for machining and fabrication of materials including numerous CNC machines.

EXPERIENCE: Over thirty years experience in supplying prime and sub-contractors including:

- Litton Systems
- Rockwell International
- General Electric
- Honeywell, Sperry
- Pratt & Whitney Canada Inc
- deHavilland Aircraft

REVISED: Mar 90

PRIOR DATA SCIENCES Ltd

ADDRESS: 240 Michael Cowpland Drive
Kanata, Ontario
Canada K2M 1P6

CONTACT: Mr Kester Hamilton, Vice President, Marketing
Tel: (613) 591-7235
Fax: (613) 591-0343

KEYWORDS: ASW, ATC, C3 Systems, Communications, Computer Graphics, Computer Simulation, Computers, Consulting, Data Acquisition, Electronic Warfare, Feasibility Studies, Graphics, Life Cycle Support, Module Design, Program Management, Radar, Requirements Analysis, Simulation, Software Development, Software Engineering, Software Services; Surveillance; Systems Analysis; Turnkey Computer Systems.

HISTORY: PRIOR Data Sciences Ltd was founded in early 1977 and has experienced steady growth to its current level of 203 employees (Dec 89). The company is Canadian owned and is located in Ottawa (headquarters), Halifax, and Toronto. There are no US subsidiaries.

CAPABILITY: PRIOR has capabilities in:

- "Turnkey" computer systems development for real-time applications.
- Air traffic control and command and control systems.
- All phases of software project development and life cycle support.
- Software engineering consultation and contact support services.
- Software product development and sales.

Computer systems development may range from microprocessors to mainframes. In the industrial field, PRIOR has considerable experience with the DEC PDP-11 and VAX family of computers, the RSX-11M, RT-11, VMS, and UNIX operating systems, and the Pascal and C programming languages. In the military field, PRIOR has significant expertise with the UYK-20 and associated computers, and the CMS-2 and Ada programming languages. They have assumed responsibilities as a software subcontractor and as a turnkey system developer.

PRIOR has participated in all phases of software project development. This experience includes:

- Research and development.
- Feasibility studies and requirements analysis.
- Systems analysis, systems specification, and hardware procurement.
- Proposal preparation and evaluation.
- System design and detailed module design.
- Module code and testing.
- System integration.
- Acceptance test plan preparation.
- Software maintenance and enhancements.

Software engineering consultation and contract support services can be provided for all of the above phases of software project development from requirements analysis to software maintenance.

AVERAGE WORK FORCE: Professionals – 100
Others – 100

GROSS SALES: 1988 - \$9.5M
1989 - \$14.3M

PLANT SIZE: 30,000 sq ft (Ottawa)
2,000 sq ft (Toronto)
2,000 sq ft (Halifax)

EQUIPMENT: DEC PDP-11/44, Perkin-Elmer 7/32, WICAT 68000, Micro VAX II, and PCs.

EXPERIENCE. PRIOR has participated in the following military application areas. Command and Control, Electronic Warfare, Anti-submarine Warfare (ASW); Communications; Surveillance; Graphics; and Simulation.

PRIOR has worked directly for DND or as a subcontractor on many of DND's recent major projects. These include NFA, CPF, AURORA, ADLIPS, CANEWS SHINCOM, MACs, and MCOIN II. PRIOR has successfully teamed with other members of Canadian industry such as Leigh Instruments, Litton Systems Canada Ltd, Westinghouse, and Rockwell.

In the area of military research and development, PRIOR has had a continuing involvement with projects at the Defense Research Establishment Ottawa and the Communications Research Center. These projects have been concerned with radar, direction finding, electronic warfare, countermeasures, analysis, navigation, graphics, and simulation.

PRIOR's three, major, real-time application areas are the Military, Air Traffic Control, and Supervisory Control and Data Acquisition.

Sixty percent of the company's work is military-related. There has been no direct contact with the US military. All experience to date has been either with the Canadian Department of National Defence or as a subcontractor on a DND-sponsored project.

REVISED: Mar 90

QUANTUM INSPECTION AND TESTING Ltd **(A partner in the Westinghouse Services Group)**

ADDRESS: 916 Gateway
Burlington, Ontario
Canada L7L 5K7

CONTACT: Mr Michael Dudley, President
Mr Scott Brown, Marketing Manager
Tel: (416) 632-5869
Fax: (416) 847-1634

KEYWORDS: Calibration (Mechanical & Electrical); Fabrication Procedures, Failure Investigations, Inspection, Metrology, Non-Destructive Testing, Precision Measurement, Product Surveillance, Quality Assurance, Subcontract Management, Training, Vendor Surveillance, Welding Procedures, Testing.

HISTORY. Established in 1968 as a firm of consulting engineers, Quantum has evolved into Canada's largest specialist independent professional quality services/surveillance and laboratory testing/inspection organization dedicated to the aerospace, defense, and precision manufacturing sectors. In March 1990, Quantum Inspection and Testing Limited was acquired by the Westinghouse Services Group, which will serve to strengthen the technical resources and services available as a third party services organization.

Quantum's test center and corporate headquarters are strategically located in a new facility in the hub of Canada's manufacturing/industrial heartland, which also provides convenient access to the east and mid-west regions of the US market.

CAPABILITY: Quantum's product is contract quality services and expertise—people, facilities, and related capabilities. The company's broadly-based resources, experience, and capabilities are geared to integrate

on either a complementary or supplementary basis with the client's organization in an efficient and cost-effective manner to fulfill those requirements.

Quantum offers the following services:

- Vendor Surveillance - capability and pre-award surveys, performance monitoring, sampling inspection, test witnessing, expediting, and certification.
- Non-Destructive Testing - radiographic, ultrasonic, liquid penetrant, magnetic particle, eddy current, infrared thermography.
- Quality Management Consulting - quality systems development, training, and problem solving/troubleshooting.
- Welding/Fabrication/Consulting - procedures development/evaluation, specialized fab/repair contract management and subcontracting, applications R&D, and failure investigation
- Product Development and Research - Quantum participates in industry/government schemes for product development/improvement.
- Measurement Services - mechanical and electrical calibration laboratory, three coordinate measurement, laser theodolite dimensional coordinate analyzing capability (unlimited size and contour), casting layout, dimensional verification, and relapping and calibration of granite surface plates.

Other services include electrical calibration and electrical inspection capabilities such as inductance, resistance, impedance, and capacitance.

AVERAGE WORK FORCE: Engineers - 5
Scientists - 3
Technicians - 45
Others - 15

GROSS SALES: No data.

PLANT SIZE: 29,000 sq ft

EQUIPMENT: Complete NDE facility and mechanical metrology and measurement capability.

EXPERIENCE: All test center facilities are traceable to NRC Canada (equivalent of NBS Washington) and the operational capabilities operate under such validated governmental recognitions as the Department of National Defence, Canadian Standards Association, Department of Transportation and Communications, the Canadian Government Standards Board (US MIL and NATO standards), and Standards Council of Canada.

Buyer approvals include such organizations as Pratt and Whitney, Boeing, McDonnell Douglas, Rockwell, General Electric, Bell Helicopter, Spar Aerospace and Menasco Aerospace, etc. They are recognized by NASA as being the sole Canadian source approved for the non-destructive testing of fracture-critical components for the Space Program. Quantum has been recently appointed by Spar Aerospace to develop, monitor, and edit all NDE operations for the Space Station Freedom Project. This will incorporate all Spar vendors contracted to produce hardware for this project.

REVISED: Mar 90

QUESTOR SURVEYS Ltd

ADDRESS: Questor House
200 Grand River Ave
Brantford, Ontario
Canada N3T 4X9

CONTACT: Mr Terence J McConnell, President
Tel: (519) 753-1600
Fax: (519) 753-5533

KEYWORDS. Data Acquisition, Data Analysis, Data Reduction, Electromagnetic Surveys, Helicopter Magnetic Gradiometer, Magnetic Gradiometer, Magnetometers, Mapping, Pollution, Remote Sensing, Sensors.

HISTORY Originally a one-aircraft-operations section of a mining company, the company split in 1961 and formed a Contract Survey Services Division. During this period, the company operated one owned aircraft and three leased aircraft. In 1970, they began expanding operations, and in 1979 acquired the geophysics division of Northway Survey Corporation. During this period, they specialized in the use and development of the Barringer INPUT electromagnetic system. Questor is now associated with World Geoscience Corporation of Perth, Australia, and forms part of the largest airborne geophysical survey group in the world.

CAPABILITY Questor specializes in all state-of-the-art airborne sensing for base metal, uranium, and oil. In addition to the QUESTEM system (time-domain electromagnetics), they also are capable of acquiring and analyzing data from airborne standard and high sensitivity magnetics, standard and multi-channel spectrometry, and frequency domain electromagnetics. They also design and build very high sensitivity magnetometers along with their associated data acquisition systems. Their aircraft fleet includes two Skyvans, two Trislanders, one Aerocommander 500S and one C206. The QUESTEM system generates a pulsed signal from a vertical dipole. The primary field induces eddy currents in conductive targets, and these currents produce secondary fields. These secondary fields are then sensed. Through analysis of these secondary field anomalies, sulfide and graphite conducting pockets have been identified to a depth of 300 meters. Standard and high-sensitivity magnetometry provide detailed magnetic contour maps. Corrections for aircraft attitudes and maneuvers, and the use of precision clocks, etc., enable Questor to improve the normal high standard government contour maps by a factor of four in geologic resolution.

Gamma ray spectrometers are used to identify potential uranium deposits as well as for geologic mapping and identification of man-made radioactive wastes. Data reduction for all types of sensors/missions is provided by the company's specially developed algorithms and provides a variety of outputs depending on the users' needs.

Questor has recently organized an internal Research Division. They are presently working to improve the various sensors used by Questor.

AVERAGE WORK FORCE: 17

GROSS SALES: 1988 - \$1.2M
1989 - \$2.5M

PLANT SIZE: 10,000 sq ft

EQUIPMENT: Equipment includes QUESTEM time domain electromagnetic system and cesium high sensitivity magnetometer and gradiometer.

EXPERIENCE: Questor's clients include 49 different countries around the world for one or more of their surveys. Their surveys have led to the discovery of fourteen base metals, precious metals, or uranium deposits in a variety of geologic environments. In Canada, customers have included Noranda Mines, Falconbridge Mines, Inco, Imperial Oil, Shell Oil, and Gulf Oil. They are interested in conducting research for the USAF.

REVISED: Mar 90

RAYLO CHEMICALS **(A Division of Terochem Laboratories Ltd)**

ADDRESS: 8045 Argyll Road
Edmonton, Alberta
Canada T6C 4A9

CONTACT Mr J Matthew Colomb, Commercial Manager
Tel: (403) 468-6060
Fax: (403) 468-4784

KEYWORDS Chemical Processing, Contract Research, Custom Synthesis, Monomers, Non-Routine Analysis, Physical Chemistry, Polymer Chemistry, Process Development, Product Characterization, Supercritical Gas Technology.

HISTORY. Raylo Chemicals was founded in 1961, became a subsidiary in 1981, and a division in 1985 of Terochem Laboratories Ltd, a private Canadian corporation. Terochem has no US subsidiaries.

CAPABILITY. Raylo Chemicals specializes in contract research, custom synthesis, and sales of manufactured products. Areas of expertise include bench scale pilot plant design and operation, synthetic chemistry (natural products, pharmaceuticals, and hydrocarbon chemistry), high pressure and temperature reactions, polymer chemistry (synthesis of novel monomers and their polymers, characterization, and chemical stability testing), and non-routine analysis. A major contract activity is polymer chemistry applied to stable, high-strength polymers for composites, elastomers, water-soluble polymers, flocculation studies, and electrolyte cell separators. Other principal projects include supercritical gas technology applied to coal liquefaction and analyses of heavy oil and development of physical and physicochemical data in support of various commercial industrial processes.

Raylo Chemicals offers custom manufacture of complex chemicals and polymers from a few grams to several thousand kilograms, including process design and development. Raylo routinely handles highly reactive solid, liquid, and gaseous reagents, and can operate under vacuum and inert atmospheres. The following reactions are performed regularly.

- Acylation
- Alkylation
- Condensation
- Dissolved Metal Reduction
- Friedel-Crafts Reactions
- Grignard
- Halogenation (substitution and addition)
- High Vacuum Distillation
- Hydrogenation
- Hydrolysis
- Metal Hydride Reduction
- Optical Resolution
- Phosgenation
- Reductions

Raylo Chemicals products include specialty polymers and other fine chemicals for high-technology industries. Over 150 compounds are currently in production, and for many of these, Raylo is the sole or principal world manufacturer.

AVERAGE WORK FORCE: PhD Chemists - 10
Chemical Technicians & Operators - 35
Others - 10

GROSS SALES: 1988 - 8.0M
1989 - \$10.0M

PLANT SIZE: 16,000 sq ft
6,000 sq ft (laboratory and library)

EQUIPMENT. Raylo Chemicals has well-equipped laboratories with the following instruments. 60 MHz proton magnetic resonance spectrometer, infrared and ultraviolet spectrophotometers, high-performance liquid chromatograph, equipped with a variable wavelength ultraviolet detector with stop-flow capability; gas chromatograph, both packed column and capillary column, with FID and TC detectors; size exclusion chromatography system with differential refractometer; and other up-to-date chemical, biochemical, and physical equipment.

Under an established arrangement with the University of Alberta, high-resolution instruments such as Fourier Transform Infrared Spectrometer, Fourier Transform (100, 200 and 400 MHz) and Carbon-13 magnetic resonance spectrometers, and low and high resolution mass spectrometers are available to Raylo's research staff. Raylo also has access to and experience in using a low angle laser scattering photometer (KMX-6), particularly useful for determination of absolute molecular weight and molecular weight distribution polymers.

Raylo's plant equipment includes multi-purpose glass and stainless steel, jacketed, stirred reactors in the 10-1000 gallon range and a broad selection of separation equipment. A production plant (multi-ton quantities) is scheduled to be operating in mid-1990.

EXPERIENCE The company has produced 77 patents and 35 publications. Raytheon's clients are government, universities, and industry in the US, Canada, Europe, and Japan.

REVISED: Mar 90

RAYTHEON CANADA Ltd

ADDRESS: 400 Phillip Street
Waterloo, Ontario
Canada N2J 4K6

CONTACT: Mr Graham R Beaumont, Director of Marketing
Tel: (519) 885-0110
Fax: (519) 885-8620

KEYWORDS: US Primary Surveillance Radar; Ground Control Approach Radar; Precision Approach Radar; Radar; ATC Display Systems; Flight Data Processing; Radar Data Processing; Satellite Earth Stations, EHF Synthesizer, ATC.

HISTORY Raytheon Canada Limited is a high-technology electronics company established as a Canadian corporation in 1956. Raytheon Canada is an independent, wholly owned subsidiary of the Raytheon Company, Lexington, MA.

CAPABILITY: Raytheon Canada designs, develops, and manufactures air traffic control (ATC) and communications systems for civil and military applications for the world market. As a complete system supplier, Raytheon Canada is equipped to take on assignments of a national scope. In its role as a developer and manufacturer of high technology, state-of-the-art systems, Raytheon Canada's product base includes a broad range of ATC equipment including primary radars for terminal and en route applications, and ground control approach radar systems (mobile and fixed base). Raytheon Canada also has a distinguished background in the design and manufacture of a wide range of communications equipment for both domestic and export markets. Products in this area span the range from microwave components to complete satellite ground stations and terrestrial microwave systems.

AVERAGE WORK FORCE: PhDs - 3
Engineers - 53
Others - 660

GROSS SALES: 1988 - \$132M
1989 - \$103M

PLANT SIZE: 132,000 sq ft

EQUIPMENT In-house computer systems include VAX and IBM. Manufacturing includes some of the most sophisticated, fully automated machinery available for today's technology, such as Hardinge precision lathes, and a group of vertical and horizontal mills with Direct Read-Out Control. The test area also includes the most up-to-date multi-layer board test equipment.

EXPERIENCE: Raytheon Canada's customers include Transport Canada and the Department of National Defence. Previous customers include all Canadian telephone companies, Telesat Canada, and Teleglobe, as well as numerous overseas PTT's, etc., and Civil Aviation Authorities.

REVISED: Mar 90

RE:ACTION MARKETING SERVICES Ltd (RE:PRINT COPY & PRINTING Ltd)

ADDRESS: 517 Parliament Street
Toronto, Ontario
Canada M4X 1P3

CONTACT: Mr Gerald R Graves, President
Mr John J Iskra, General Manager
Tel: (416) 964-8049
Fax: (416) 964-8386

KEYWORDS: Data Communications, Data Conversion, Desk Top Publishing, Direct Mail, Documentation, Editing, Electronic Publishing, Graphics, Laser Printing, Marketing, Microcomputer Programming, Operations Manuals; Printing; Public Relations; RFP Response; Reference Manuals; Reports; Specifications; Systems Facility Management; Systems Facility Services; Technical Manuals; Telecommunications; Text Management; Training Manuals; User Manuals; Word Processing; Writing; Vector Graphics; Technical Writing; Systems Integration; Project Management.

HISTORY: Both Re:Action Marketing Services and Re:Print Copy & Printing were founded by Gerald R Graves, who is president and sole director of both firms. Established in 1977, Re:Action initially offered advertising, marketing, and promotion services. Recognizing the potential of computer-based word processing and other office automation technology, Graves expanded both companies' facilities to provide many of these new services, starting with the establishment of both Re:Print and Re:Action's Document Creation Centre in 1978. As a result, Re:Action Marketing Services and Re:Print Copy & Printing now offer not only advertising, marketing, sales promotion, and public relations services, but also automated text and data creation, desk top publishing, data conversion, word and information processing, telecommunications, laser printing, graphic design, writing, editing, and system facility management and consulting services. Today, many of Re:Action's clients use the Document Creation Centre to supplement their in-house capability on a regular basis.

CAPABILITY: Re:Action and Re:Print are primarily involved in print communications of all types, including text creation, enhancement, and print production projects; marketing plans, product sheets, technical, user, and training manuals, sales and support documentation; RFP responses, chemical, medical, and engineering specifications and operations guides, biological abstracts; and reference works. Re:Action and Re:Print also offer complete writing, editing, graphic design, and marketing, and promotional services. Both facilities and personnel have clearance to NATO secret level.

AVERAGE WORK FORCE: 26+

GROSS SALES: 1988 - \$1.5M
1989 - \$1.75M

PLANT SIZE: 7,500 sq ft

EQUIPMENT: The companies are well equipped with the latest in PC-based publishing hardware and software and communications and data format conversion capabilities.

EXPERIENCE: Services are available in both French and English. Customers include General Motors, Thomson-CSF, Ontario Ministry of the Environment, Canac Telecom (CN Communications), Chemetics (CIL), Chrysler Canada, Warner Lambert, Motorola Information Systems, Institute for Hydrogen Systems, Procter & Gamble, Addiction Research Foundation, Guaranty Trust, Liquid Carbonic Inc, Ontario Economic Council, Ontario Ministry of Education, Marshall Macklin Monaghan, Atomic Energy of Canada, Consumers Gas Company, Envirionics Research Group Ltd, Municipality of Metropolitan Toronto, Ontario Ministry of Municipal Affairs & Housing, Price Daxion, Supply and Services Canada, Toyota Canada, and Xerox Canada.

REVISED: Mar 90

RHK AERO SUPPORT Inc

ADDRESS: 270 Millway Avenue
Concord, Ontario
Canada L4K 3W4

CONTACT: Mr Michael Payne, General Manager Sales and Marketing
Tel: (416) 660-7070
Fax: (416) 660-0682

KEYWORDS: Generators; R&O (Motors); R&O (Generators); Regulators; Inverters; Hydraulic Pumps; Motors; Actuators; Landing Gear; Skydrol; Rewind Rotors; Armatures; Stators; Coils; Exciters; Transformers.

HISTORY. RHK Aero Support Inc is a Canadian-owned company, originally known as Royal Aircraft Rewind. It was engaged primarily in the rewinding of generator subcomponents, rotors, stators etc. Royal Aircraft was moved to a new 40,000 sq ft facility, early in 1989, and RHK Aero Support was established to compete for the repair and overhaul of generators and electric and hydraulic components.

CAPABILITY. RHK Aero Support is primarily involved in the repair and overhaul of aircraft components. Specializing in electric and hydraulic components, RHK is set up to test 60 KVA generators on 200HP stand. Six dynamic test stands from 20-200 HP include 24,000 RPM capability. Our avionics test panel contains the latest range of universal test equipment necessary to conduct acceptance test procedures on a wide variety of avionics products including GCU, regulators, inverters, contractors, and relays. Our hydraulic test stands for MIL 5606 and Skydrol allow testing of hydraulic pumps, motors, PTU valves, and land gear assemblies. RHK Aero Support and Royal Aircraft can overhaul and repair components for many commercial and military aircraft.

AVERAGE WORK FORCE. No data.

GROSS SALES: 1989 - \$1.7M

PLANT SIZE: 40,000 sq ft

EQUIPMENT: The company's equipment includes 6 Dynamic test stands to 200 HP/24,000 RPM, Avionic Universal Test Panel, MIL 5606 and Skydrol test stands, and a Schenck balancing machine.

EXPERIENCE: Present customers include various departments in the Canadian Government including Department of Transport and RCMP and major airlines in both Canada and the USA.

REVISED: Mar 90

ROCKWELL INTERNATIONAL OF CANADA Ltd (Collins Canada Division)

ADDRESS: 150 Bartley Drive
Toronto, Ontario
Canada M4A 1C7

CONTACT. Mr R Zanette, Marketing Manager
Tel: (416) 757-1101
Fax: (416) 757-1101, ext 342

KEYWORDS: Avionics; Communication Shelters; Communications; HF Airborne Communication Systems; HF Packset; HF Receivers; HF Transmitters, Support Activities (Radio/Comm), Systems Design (Radio/Comm).

HISTORY: Collins Radio of Canada Ltd was formed in 1953 as a wholly-owned subsidiary of Collins Radio Company of Cedar Rapids, Iowa. With the acquisition of Collins Radio by Rockwell International in 1973, it became a Division of Rockwell International of Canada.

CAPABILITY: The Collins Canada Division is engaged in the manufacture of radio communications products, systems designs, and support activities. Principal products are HF receivers and transmitters, general purpose VLF/LF/MF/HF receiver, miniature HF single channel synthesized receiver, HF man pack transceiver, 150-watt HF power amplifier/antenna coupler, preselector for an extended range communications system, and standard and custom transportable HF communication shelters. Products and systems are sold world-wide.

AVERAGE WORK FORCE: Engineers - 25
Technicians - 30
Others - 160

GROSS SALES: 1988 - \$65.0M
1989 - \$45.0M

PLANT SIZE: 122,000 sq ft

EQUIPMENT. Rockwell's facility is equipped for all types of electrical and mechanical assembly employing advanced techniques such as computerized wave soldering, auto insertion for ICs, and axial lead components. Product quality is assured by intensive in-process and completed-item inspection. Test equipment is maintained and calibrated on regular cycles. Calibration is traceable to the Canadian National and US National Bureau of Standards. Requirements of the Canadian Government DND 1015 and by reciprocal agreement, US MIL-Q-9858A for quality standards are met. A detachment of the Canadian Forces Technical Services Agency is resident at the facility.

EXPERIENCE. Since its inception as a manufacturing facility in 1955, Collins Canada has been providing UHF/VHF/HF equipment and systems to the Canadian Forces, the US military, Canadian Ministry of Transport, and a wide range of other countries. Current products are being supplied to all US military services, Canadian Forces, and other countries. Products include equipment such as the HF-80 transceivers, the HF-2050 receiver, the S-1 HF receiver, the AN/PRC-515 HF packset, Collins 549-1 150-watt HF power amplifier/antenna coupler, the F-1535 rapid tuning band pass filter, and the AN/TSC-60(V)7, (V)8, and (V)9.

REVISED: Mar 90

ROHDE & SCHWARZ CANADA Inc

ADDRESS: 555 March Road
Kanata, Ontario
Canada K2K 2M5

CONTACT. Mr David G Stephenson, General Manager
Tel: (613) 592-8000
Fax: (613) 592-8009

KEYWORDS: Communications; Direction Finders; Testing/Test Equipment, Telecommunication Test Equipment, Test Instrumentation, Automated Monitoring and Control; Electronic Warfare; Electronic Support Measures; Broadcasting; Antennas; Electromagnetic Compatibility; RF Communications.

HISTORY: Rohde & Schwarz Canada Inc, a wholly owned subsidiary of Rohde & Schwarz GmbH, was established in Canada in 1970 to be responsible for the sales and service of Rohde & Schwarz products throughout Canada. In 1984 a research and development and manufacturing capability was started to specialize in communications intelligence and communication direction finders for defence and surveillance activities.

CAPABILITY: Rohde & Schwarz Canada Inc is a recognized Canadian leader in the fields of:

Electronic Test and Measurement Equipment and Systems

- EMI/EMC test systems
- RF analysis
- Signal generators to 18 GHz
- Radio communication tests and analyzers
- Controllers
- Remote integrated monitoring and measurement systems

Radio Monitoring and Direction Finding Systems

- Receivers 10 KHz to 18 GHz
- Antennas
- Direction finders, HF, VHF and UHF
- Radio monitoring systems

Radio Communications Systems

- Air traffic control
- HF systems and networks
- Aircraft radio sets and controllers
- Shipboard communication systems
- Mobile radio systems

The company has a full capability to undertake engineering development and manufacturing of products related to RF direction finding and electronic support measures, as well as special purpose test equipment for automatic monitoring and remote control.

In the field of direction finding systems, Rohde & Schwarz Canada designed and developed the PA 2000 Integrated Signal Intercept System. The PA 2000 is a state-of-the-art signal interception and direction finding system which has been designed to detect and provide lines of bearing to radio emitters, including frequency agile radios in the HF, VHF, and UHF ranges. The company has the world product mandate for the PA 2000 and related products.

Rohde & Schwarz Canada is a member of the worldwide Rohde & Schwarz organization, giving it access to the technologies and marketing resources of all of the affiliated companies. Canadian offices are maintained in Kanata, Toronto, and Montreal to provide sales and support of all Rohde and Schwarz products directed to the defense, communications, broadcasting, and test and measurement markets.

AVERAGE WORK FORCE: PhD – 1
Engs – 12
Others – 40

GROSS SALES: 1988 – \$4.5M
1989 – \$7.0M

PLANT SIZE: 18,400 sq ft

EQUIPMENT Electronics and mechanical design and development software, including simulation capability and CAD electronics testing facilities for RF receivers, antennas, and direction finders

EXPERIENCE The primary customer base includes government organizations in Canada (DND, Transport, Communications) and abroad. Significant sales are made to defense prime contractors, telecommunications operators, and broadcasters

REVISED: Mar 90

ROLLS-ROYCE (CANADA) Ltd

ADDRESS: 9500 Cote de Liesse Road
Lachine, Quebec
Canada H8T 1A2

CONTACT: Ms D Bayly, Account Manager, US Military Programs
Tel: (514) 631-3541
Fax: (514) 636-9969

KEYWORDS: Aluminum Components, Calibration, Combustion Research; Components (Engines), Corrosion Control, Engine Components; Engine Systems; Engines; Gas Turbine Engines; Heat Treating; Life Cycle Support; Magnesium; Metal Plating; Non-Destructive Testing; R&O (Engines); Tool Fabrication; Turbine Blade Inspection, Turbine Engines; Welding; Compressor Blade Tip Grinding

HISTORY: Rolls-Royce Canada was founded in 1952 for the production and support of Nene engines powering the Canadian Armed Forces' T-33 trainer aircraft built by Canadair. From that specialized beginning, Rolls-Royce Canada has continually grown and diversified. Still expanding today, Rolls-Royce Canada is a modern broadly-based aero and industrial engine facility. The company is a wholly-owned subsidiary of Rolls-Royce plc.

CAPABILITY: Repair and overhaul is the backbone of Rolls-Royce Canada's business. The company has the ability to repair and overhaul the following engines:

- Military – Nene; GE T64.
- Civil – Spey; Dart; Viper; RB211, Tay
- Industrial – Avon; RB211; Spey.

A repair engineering group works closely with prime manufacturers and the repair industry to develop and apply new repair techniques and processes. Repairs are carried out in accordance with the original manufacturer's specifications. In addition, Rolls-Royce Canada has developed more than 5000 repair schemes in an effort to increase component lives and to reduce overhaul costs.

Rolls-Royce Canada is the world source for the industrial RB211 gas generators. This aero derivative gas turbine is manufactured to aerospace standards. The company has developed and manufactures the off-engine support systems for the engines.

AVERAGE WORK FORCE: Salaried – 227
Hourly – 520
Management – 44

GROSS SALES: 1988 – \$136.7M
1989 – \$160.5M

PLANT SIZE: 180,000 sq ft (current factory space)
65,000 sq ft (warehouse)
45,000 sq ft (office)

4 engine test cells

A plant extension is to be built in 1990 providing an additional 54,715 sq ft of factory space. The area is to be shared between a new large engine build shop and a new wash, NDT, and process facility.

EQUIPMENT: The repair shop contains a wide range of general purpose machine tools to enable turning, milling, jig boring, grinding, and electrical discharge machining to be carried out on a wide range of materials. The latest addition to machining capabilities is a Butler Newall compressor blade tip grinding machine. Welding capabilities include Hobart Dabber Automatic Pulse Weld System, TIG weld, metallic arc resistance, needle arc, torch brazing and vacuum, or inert gas high-temperature brazing. Heat treatment includes argon or hydrogen-controlled atmosphere, low- and high-temperature vacuum heat and aluminizing. Metal spray capabilities are thermal spray (powder and wire) including 6P gun and plasma spray; erosion or wear resistant hard coatings; abrasable coatings; thermal barrier (ceramic) coatings, and anti-corrosion coatings. Processing capabilities include non-metallic coatings, rubber wear away and PL95; nickel; chrome, silver; cadmium; copper; SerMetal processing; tin; lead-tin and Tribomet wear resistant coatings; soft anodizing; alodine dichromate surface treatment and phosphating, vapor blasting, dry blasting, and shot peening; electroless nickel plating; and aerofoil surface superfinish. Balance includes static/vertical and dynamic/horizontal.

Rolls-Royce Canada operates four diverse engine test facilities capable of testing a wide range of equipment encompassing piston engines, turboprops, and turbofans. A new state-of-the-art test bed was inaugurated in November 1986, which can accommodate engines of up to 100,000 lbs thrust. The company designs and engineers all supporting systems (starting, fuel, lubrication, cooling), equipment (cradles, carts, tooling), safety controls (interlocks, alarms, trips), and instrumentation.

The laboratory presently holds DND approval number 020-2/56 to act as a chemical, metallurgical, and mechanical test establishment and offers a wide range of services encompassing tensile testing, hardness testing, metallography, electronic and instrumentation testing, and radiographic and ultrasonic testing.

EXPERIENCE. Rolls-Royce Canada is highly export-oriented, over 80% of the company's business is with non-Canadian customers. Although 84% of the customer base is within the continental Americas, Rolls-Royce Canada customers now originate in the Middle and Far East, Europe, and Africa.

Rolls-Royce Canada has over 38 years' experience in heavy maintenance support of aero engines for military and civil operators around the world. A specialist repair engineering group develops new repair technology for economic piece part repair.

The sheet metal and welding shop carries out complex repairs on sheet metal fabricated components as well as repairing main casings by weld build-up prior to re-machining. Sheet metal components made from high-temperature resistant alloys of nickel and chromium such as combustion liners, turbine entry ducts, seal fins, and jet pipes are repaired by direct welding or the fabrication of locally formed patches welded into the structures. Resistance weld certification in accordance with MIL-W6858 and MIL-STD-1595A and fusion weld approvals can be carried out in accordance with D49-001-24/SF-001.

Rolls-Royce Canada ensures approvals are maintained by implementing a total quality system of clear instructions and accountability throughout the organization together with auditable evidence. To meet calibration standards, an environmentally controlled standards room to AQAP-1 is in use. Quality approval conforms with the following specifications. DND-AQAP-1, DOT Approval No. 1/58, and CAA A1/2423/47. The company is also approved to the following MIL specifications. MIL-Q 9858A, MIL-I-45208, MIL-I-6868, MIL-I-6870, MIL-STD-453, MIL-STD-410, MIL-STD-45662, MIL-STD-120, MIL-A-8625, MIL-B-7883, MIL-C-14550, MIL-C-28074, MIL-C-5541, MIL-H-6875, MIL-M-3171, MIL-T-10727, MIL-2-6858, MIL-W-18326, MIL-W-8604, and MIL-W-8611.

REVISED: Apr 90

SCINTREX Ltd

ADDRESS: 222 Snidercroft Road
Concord, Ontario
Canada L4K 1B5

CONTACT: Dr H O Seigel, President
Tel: (416) 669-2280
Fax: (416) 669-5132

KEYWORDS Atomic Absorption Spectrophotometers, Beta Ray Monitors, Dosimeters, Drug Detection, Electromagnetics, Gamma Ray Monitors, Geochemical Equipment, Geophysical Equipment, Gravity Sensors, Hazardous Gas Detection, Magnetic Sensors, Ordnance Detectors; Radiation Monitoring Systems; Remote Sensing; Toxic Gas Detectors; Trace Gas Detection; Tritium Monitors; Ultraviolet Fluorescence Systems.

HISTORY: Scintrex Ltd began as Sharpe Instruments Ltd in 1947 and was incorporated as Scintrex Ltd, a public Canadian owned company, in 1967.

CAPABILITY: Scintrex Defense Products Division is a supplier to the US DOD of high sensitivity portable (Mark 22) magnetometers for explosive ordnance detection. In addition, it supplies area radiation monitors (AN-GDQ-3) for the determination and transmission of the level of nuclear radiation around strategic locations. Similar military-specification radiation monitors are being developed for mobile applications (ship, vehicle and aircraft installations). An explosives vapor detector (bomb sniffer) has been developed in conjunction with the National Research Council of Canada for defense against acts of terrorism. The potential application of laser-based, active remote sensing methods to certain defense problems is now being investigated. In addition, a detector of PGDN vapors from OTTO II Torpedo fuel has been developed on behalf of the Canadian Department of National Defence and provided to the Canadian Navy for use in their depots, ships and submarines to protect personnel against these toxic vapors.

The Contract Instrumentation Division of Scintrex began developing monitoring instrumentation in 1974 for CANDU nuclear power plants. Since then, the company has manufactured tritium monitors, reactivity control logic cabinets, shut-off rod logic modules, high radiation hand-held monitors and logic panels for safety shut-down systems. CANDU reactor operators in Ontario, Quebec, New Brunswick, Korea, and Argentina use this equipment.

The Exploration and Analytical Equipment Divisions of Scintrex are a major part of it's business. They include the design, development and manufacture of geophysical and geochemical instruments for the mining industry, and analytical instruments for chemical laboratories. Over the years, geophysics has become the key exploration tool for discovering new mineral deposits. The steady depletion of surface ore bodies and consequent need to detect buried deposits have produced a growing dependence on geophysical methods. Scintrex is a leader in the design, development and manufacture of mining exploration equipment. Its products, services and skills have contributed directly to numerous major mineral discoveries in different parts of the world. Out of this experience, there is an expertise in developing portable analytical equipment for remote, on site chemical analyses.

The Systems Engineering Group of Scintrex is highly experienced in the installation of sensing systems in aircraft, helicopters and vehicles

for mobile applications. Many magnetic, electromagnetic, radiometric and laser installations have been made, operated and serviced.

Ruggedized, portable gas chromatographs have been developed which are optimized for detecting various vapors of interest to defense forces, including those arising from explosives and torpedo fuel, to date. Detectors for illicit drugs have also been developed using similar principles.

AVERAGE WORK FORCE. Electronic Engineers - 12
Mechanical Engineers - 2
Chemists - 5
Geophysicists - 3
Physicists - 4
Technicians - 40
Machinists - 20
Sales, Office Staff & Others - 83

GROSS SALES: 1988 - \$12.2M
1989 - \$12.6M

PLANT SIZE: 70,000 sq ft

EXPERIENCE: Scintrex has had experience with the US Army and Navy (contracted to build nuclear radiation monitoring systems and explosive ordnance detectors); Ontario Hydro (contracted to supply hand-held radiation dosimeters for nuclear power plants), and other CANDU reactor users (contracted to build a variety of radiation monitoring devices) and the Canadian Department of National Defence (development and supply of PGDN and radiation monitors).

REVISED: Mar 90

SEA Ltd

ADDRESS: PO Box 13606, Station "A"
St John's, Newfoundland
Canada A1B 4G1

CONTACT: Art Garland, Vice President Marketing
Tel: (709) 364-2075
Fax: (709) 364-8098

KEYWORDS. Ground Fault Detectors, Personnel Entry Control Systems, Energy Management Systems, Telemetry Systems, Pressure Gauges, Valve Indicators, Alarm Systems, Pump Control Systems, Supervisory Control Systems, Data Acquisition Systems, Computer Systems, Process Control, Instrumentation Equipment, Robotics, Cycle Charge.

HISTORY. SEA Limited is a high-technology, Atlantic-Canadian company established in 1983 with offices in Newfoundland and Nova Scotia.

CAPABILITY. SEA Limited specializes in electronics and electrical and electro-mechanical systems. The company designed and built a package power center (cycle charge), which is a self-contained power center for remote radar and microwave locations. SEA Limited also designed, manufactured, and commissioned alarm monitoring, ballast control, watertight door alarm monitoring, leak detection alarm monitoring, tank gauging, pressure and vibration analysis, power measurement, and productivity enhancement. Their capabilities cover the areas of engineering, software design and development, systems management, production, quality assurance, documentation, and training.

SEA is an authorized distributor for Zenith line of computer products in Newfoundland and Labrador. The company markets a complete line of peripheral equipment and computer software for Zenith computers, IBM microcomputers, and its compatible competitors. SEA Limited specializes in the design and/or equipment selection for motor control circuits, process control loops, data collection systems, pump control systems, NC and CNC robots, mimic displays (fixed and variable), color graphics for process and digital control, programmable controller (PC) systems, energy management systems (EMS), telemetry systems, computer interfacing.

AVERAGE WORK FORCE. Engs - 8
Others - 33

GROSS SALES: 1988 – \$5M
1989 – \$6M

PLANT SIZE: 4,000 sq ft

EQUIPMENT: No data.

EXPERIENCE SEA's customers include numerous commercial organizations and departments of federal and provincial governments.

REVISED: Mar 90

SED SYSTEMS Inc

ADDRESS: PO Box 1464
Saskatoon, Saskatchewan
Canada S7K 3P7

CONTACT: Mr David Heath, Business Manager Defence and Government Systems
Tel: (306) 933-1446
Fax: (306) 933-1486

KEYWORDS: Aerial Target Tracking System, Communications Systems, Computers; Digital Switches, Satellite Ground Control Equipment, Ground Stations, In-Orbit Real-Time Test Systems; Command and Control Centers, Space Science Instrumentation, Payload Design, Payload Test Services, Program Management, Satellite Communications, Ground Stations, Satellite Telemetry Tracking and Command Stations; Simulation Programs, Systems Engineering, Systems Studies.

HISTORY: SED Systems Inc is an advanced technology company specializing in communications systems, engineering, software development, and custom electronic manufacturing in space and defense. Located in Saskatoon, Saskatchewan, Canada, SED evolved from the Space Engineering Division of the University of Saskatchewan where their mandate was to design and build rocket instrumentation for upper atmospheric research. Since their incorporation as a private company, SED has pursued a development policy which has firmly established them as a leader in communications technology for both commercial and defense applications. SED was incorporated in 1972.

CAPABILITY: SED supplies systems engineering and custom manufacturing in space and defense communications advanced technology. The major products and services offered are:

- Communications systems engineering, custom satellite communications earth stations, complete satellite telemetry tracking and command earth stations, satellite ground control equipment, in-orbit test systems and equipment, customized telemetry and tracking systems, sounding rocket payloads, and scientific instrumentation for use on the space shuttle.
- Two-way, voice and data satellite communications system, SKY SWITCH™ and Vsat, for private networks; TVRO systems and subsystems for satellite earth stations; and design of radio and microwave communications links for frequencies in the HF through EHF bands.

• • ERAGE WORK FORCE. Professional – 85
Technical – 165

GROSS SALES: 1988 – \$23M
1989 – \$25M

PLANT SIZE 43,000 sq ft (manufacturing)
82,000 sq ft (other)

EQUIPMENT: SED has a variety of specialized facilities including computer systems, earth stations, and payload integration facilities, Class 1000 clean room, a medium volume PCB production facility working to AQAP-1 for specifications and NASA standards for space qualified hardware; and a thermal vacuum chamber.

EXPERIENCE SED experience in the space and defense areas includes:

• **SPACE:** Payloads – Sounding rocket and balloon payloads (Canadian National Research Council); Firewheel sub-satellite. Space Instrumentation – GEODE 1 prime contractor to NRC for the manufacture in microgravity of crystals; Wide Angle Michelson Doppler Imaging Interferometer for NASA shuttle; Suprathermal and Energetic Ion Mass Spectrometer (Japanese AKEBONO satellite) measures solar emissions; COBRA (Jan 1990 launch) to measure primeval light left over from big bang. Mission Planning and Support – Communications Technology Satellite (1970-1976) ground control station and software for the Canadian Department of Communications (DOC). Satellite Telemetry, Tracking and Command Stations – ANIK A TAC station, Telesat Canada; ANIK C/ANIK D transportable tracking station; LANDSAT/GOES tracking station, Canadian Center for Remote Sensing (CCRS); and Brazil Telecommunications Satellite System Satellite Control Facility. Ground Control Equipment – ANIK C, ANIK D, SBS, and INTELSAT V command generators and upconverters and telemetry displays. Communications Earth Terminals – over 200 terminals including low cost TV receive only, and 2 way fixed and transportable terminals. Satellite Systems Test Sets – ANIK C/SBS and ANIK D computerized payload test and integration support unit and in-orbit test systems for Embratel, SES, and British Satellite Broadcasting.

• **DEFENSE:** Digital Switches – switches to handle digitized radar data for NORAD Joint Surveillance System and digital switches for Hughes Aircraft Co. Satellite Control Centers – SRSAT Canadian Mission Control Center engineering and operational phases of this development project for the Department of National Defence. Tracking Systems – Air Defense Aerial Target Tracking System a tracking antenna and telemetry receiving system for Defense Research Establishment Suffield. Communications Systems – designed, developed, and installed a full, 2-way satellite communications ground system for the DND and Telesat Canada. SED is the system designer and the system integration and test manager for the communications and the meteorological systems for the new Canadian Patrol Frigates. Design and manufacture of specialized test sets to AQAP-1 standards for the Low Level Air Defence Project (LLAD).

SED provides space and defense systems to Sperry, Oerlikon, Telesat, Department of National Defence, Hughes Aircraft Co, Embratel, British Satellite Broadcasting, Canadian Department of Communications, Max Plauk Inst, and the Canadian National Research Council.

REVISED: Apr 90

SEI INDUSTRIES Ltd

ADDRESS: 406 – 5940 No. 6 Road
Richmond, British Columbia
Canada V6V 1Z1

CONTACT: Mr Peter Van Bodegom, Sales Manager
Tel: (604) 270-6433
Fax: (604) 270-6048

KEYWORDS: Collapsible Storage Containers; Fabric Structures; Fire Fighting Equipment; Fuel Storage; Fuel Systems; Helicopter External Load Equipment, Inflatable Floats, Inflatable Rescue Equipment, Tanks (Collapsible); Thruster Motors (Electric); Underwater Salvage Equipment; Water Reservoirs; Water (Potable) Storage; Water Transport; Aircraft Engines (Experimental).

HISTORY: SEI Industries Ltd was incorporated in May 1978 as a product development/marketing company, and since January 1983, has been involved exclusively in the design, manufacture and marketing of its own products.

CAPABILITY. SEI Industries Ltd is primarily involved in the design, manufacture and marketing of fabric-related products for the military, aviation, mining, forestry, and oil and gas industries. Current products include:

- The Bambi Bucket – an all-fabric fire fighting bucket for helicopters. Since its introduction to the world market in 1983, the Bambi Bucket has become the standard for such equipment.

and is now being specified as the only product acceptable for forest fire fighting contracts by a growing number of forestry agencies, fire departments and military organizations all over the world.

- The Fuel Easy – a fully collapsible lightweight, free-standing, flyable fuel container for helicopters is a convenient and cost-effective alternative to fuel drums. The Fuel-Easy reduces the causes of fuel contamination because it fills from the top and is locked for security by a Kamlopp cap. It empties from the bottom to prevent wastage through unused fuel.

- The Terra Tank – SEI Industries utilizes the latest in high-tensile strength/lightweight fabrics to produce a new generation of ground fuel storage bladders which replace the old generation of bladders made of heavy rubber compounds. This lightweight feature is crucial to the aviation industry. The Terra Tank is used in helicopter operations (often in conjunction with the Fuel-Easy), as well as in many other operations requiring high volume, collapsible, ground fuel storage capabilities. The Terra Tank is also available for POTABLE WATER storage and can be made to meet military specifications. Standard grades for potable water use US Food and Drug Administration approved fabrics. Custom Terra Tanks can be made for boats, trucks, helicopters, fixed-wing aircraft, etc.

- The Buoywall – is an open top portable water tank used for remote firefighting where there is inadequate supplies of water. They are also used in urban or rural areas where there is a need for a water reservoir. It is also used as a dip tank for helicopters using SEI's Bambi Bucket. The Buoywall assists any situation where water storage is necessary. Once emptied, the tank can easily be moved as it folds down into a convenient pile, ready for shipment or storage.

Other capabilities include inflatable float design and manufacture for light aircraft and technical problem-solving involving new-generation high strength/lightweight fabrics.

AVERAGE WORK FORCE: 40

GROSS SALES: 1988 – \$2.1M
1989 – \$2.4M

PLANT SIZE: 10,000 sq ft

EQUIPMENT: Equipment includes electronic RF welding equipment for welding of coated fabrics, assorted sewing and machining equipment, 6000 gal test tank with crane (max capability 10,000 lbs), and in-house computer systems (IBM and CADD).

EXPERIENCE: Present customers include various departments in the Canadian and US Governments, as well as other government, military, paramilitary, and commercial operations world-wide.

REVISED: Mar 90

SEMICONDUCTOR INSIGHTS Inc

ADDRESS: PO Box 130
Stittsville, Ontario
Canada K2S 1A2

CONTACT: Mr Terry Ludlow, Vice President of Operations
Ms Jennifer Labenek, Assistant Marketing Manager
Tel: (613) 831-6116
Fax: (613) 831-5001

KEYWORDS: Design Analysis Reports; Technology Reviews; Training Seminars; Reverse Engineering; Legal Support; Integrated Circuits; Memory; Semiconductors.

HISTORY: Semiconductor Insights Inc (SI) was formed in July 1989. SI has acquired the business and equipment of Mosaid Inc's former Technology Service Group. SI is located 20 minutes west of Ottawa off the Carp Road.

CAPABILITY: SI is an information source on integrated circuit design and related issues. The company publishes design analysis reports on state-of-the-art memory chips including dynamic, static, and non-volatile RAM and ROM, and ASIC chips. These analysis reports include introductory overviews, block and logic diagrams, full schematics with device sizes, timing waveforms, memory cell layout sketches, photographs of key areas of the chip, comparisons with competing parts, and process parameters.

SI also provides technology reviews which involve complete or partial analysis of prototype memory IC designs. They check for circuit functionality and optimization, thus ensuring that the customer has greater accuracy and a more readily usable database.

They prepare design seminars and in depth training courses to give memory groups access to the most innovative design ideas and talent, help define new designs, or improve existing ones.

Their legal support work consists of interpreting technology to assist in the patent licensing negotiations, litigations, contract disputes, and product liability cases. Semiconductor Insights provides technical and documentary support from their unique library to assist all persons interested in semiconductor design.

AVERAGE WORK FORCE: Engineers – 7
Technologists – 3
Other – 8

GROSS SALES: No data.

PLANT SIZE: 6,300 sq ft

EQUIPMENT: MS2300 test facility, high-magnification universal microscope (13x – 500x) with differential interference contrast (DIC), and Multiphot camera system for taking package and die photos.

EXPERIENCE: Present customers include international IC companies, government, and legal firms located in the North America, the Far East, and Europe. We deal with design engineers, IC managers, and lawyers.

REVISED: Mar 90

SENSYS

ADDRESS: 30 Bentley Avenue
Nepean, Ontario
Canada K2E 6T8

CONTACT: Mr Philip Campbell, General Manager; Director of Marketing & Sales
Tel: (613) 727-0604
Fax: (613) 727-1750

KEYWORDS: Sensor Systems; Diagnostic Systems; Engine Health Monitoring; Condition Monitoring; Predictive Maintenance.

HISTORY: SENSYS is a business unit of Atomic Energy of Canada. SENSYS was created in January 1987 to commercially develop Ferroscan™, a ferrous wear debris, monitor and other sensor technology for equipment health monitoring.

CAPABILITY: Design and production of sensor systems. Research and development of new sensor technology.

AVERAGE WORK FORCE: PhD – 1
Engineers – 6
Others – 7

GROSS SALES: 1988 – no data
1990 – \$240K (est)

PLANT SIZE: 15,000 sq ft

EQUIPMENT: Analog/digital electronics. Access to Atomic Energy of Canada's research facilities.

EXPERIENCE. Ferrous plant units are currently under evaluation and testing.

REVISED: Mar 90

SHELLCAST FOUNDRIES Inc

ADDRESS: 10645 Lamoureux
Montreal North, Quebec
Canada H1G 5L4

CONTACT: Mr B B Morgenstern, President
Tel: (514) 322-3760

KEYWORDS Castings, Enclosures (Electronic), Foundry, Investment Castings; Shell Castings; Solid Mould Castings, Thin Wall Castings

HISTORY Shellcast Foundries Inc is a Canadian owned company founded by the president/owner in 1970. The company has experienced a very steady and impressive increase in both its technological and production capabilities. It has a US subsidiary, Shellcraft Industries Inc located in Winooski, Vermont, and associate facilities in Europe.

The company's founder/president was previously engaged in the management of an investment casting foundry. The company has grown from a facility of 6,000 sq ft employing major outside services such as X-ray and testing of materials to a fully integrated facility (total in-house capability) exceeding 50,000 sq ft.

CAPABILITY: Shellcast Foundries Inc are founders of non-ferrous precision investment castings—by the lost wax process. Its major customers are in the aerospace, defense electronics, and electronics industries. Their foundries are capable of producing small and intricate castings of 1" plan area to large, complex castings of a maximum of 36" cube, to the highest MIL and commercial standards. They are equipped to produce castings by either the shell or the solid mould process.

AVERAGE WORK FORCE: Engineers - 10
Others - 140

GROSS SALES: 1988 - \$9.0M
1989 - \$9.5M

PLANT SIZE: 50,000 sq ft

EQUIPMENT Equipment includes robotics in production, in-house computerized production planning, and financial systems, spectograph and coordinates measuring machines both with computer printouts, tensile test and hardness test equipment, a complete metallurgical laboratory, and non-destructive test lab (x-ray and penetrant inspection).

EXPERIENCE Present customers include most of the major contractors in the aerospace and defense industries in North America, and they also have major customers in Europe, Israel, and Japan.

REVISED: Mar 90

SHERRITT GORDON Ltd

ADDRESS: Fort Saskatchewan, Alberta
Canada T8L 2P2

CONTACT: Dr Maurice A Clegg, Research Director
Tel: (403) 992-5151
Fax: (403) 992-5110

KEYWORDS: Abradable Seals; Advanced Industrial Materials; Alloys; Castings; Coatings; Cobalt-Samarium Magnets; Composite Powders; Conductive Plastics; Conductive Parts; Continuous Casting; Dispersion Strengthened Alloys; Electroplating; EMI Shielding; Engine Components; Engine Systems; Magnets; Metal Powders; Nickel; Nickel Coinage; Nickel Powders; Nickel Strip; Powder Metallurgy; Rare Earth Magnets; Specialty Alloys; Thermal Spraying; Titanium Alloy Powders; Ultra Fine Metal Powders; Wear Resistant Materials.

HISTORY. Sherritt is a highly diversified company with a US subsidiary located in Vancouver, Washington (Sherritt Fertilizers Inc). Sherritt was incorporated in 1927 as a mining company. In 1954, their processing plant at Fort Saskatchewan was opened. Located at this latter site is the Technology Division which is their R&D arm.

CAPABILITY. Besides refining nickel & cobalt, Sherritt Gordon carries out R&D at their research center in the area of powder metallurgy, thermal spraying, electrochemistry, and advanced industrial materials. Also at Fort Saskatchewan, Sherritt has their Special Products Division which manufactures a wide range of secondary products based on Sherritt's raw materials and technology. These products include nickel strip and coinage, a wide range of special powders and composite powders, dispersion strengthened nickel, magnetic alloys, and wear resistant materials. Sherritt is active in developing dispersion strengthened alloys and abradable seals for turbine engines. They have recently expanded their research activities to include rare earth cobalt magnets, wear resistant materials, ultra fine metal powders for sintered electronic circuits, titanium alloy powders, electrically conductive plastics for shielding electromagnetic interference (EMI), and other advanced industrial materials.

Sherritt's research and development work continued in these areas and several new products reached commercial production - notably composite powders for turbine seals, wear resistant materials for the mining industry, and ultra fine nickel and copper powders for electronics.

AVERAGE WORK FORCE. Total (Technology) - 179
PhDs - 24
MSs - 18
BSs - 50
Others - 87

GROSS SALES: 1988 - \$545M

EQUIPMENT. Sherritt's Research Center is well equipped for process research in hydrometallurgy and product research. This includes autoclaves, solvent extraction and ion exchange equipment, standard chemical laboratory equipment, and an analytical laboratory. Also included are powder presses, sintering furnaces, rolling mills, vacuum induction melting equipment, and flame and plasma spray guns. Physical testing equipment includes tensile testing, stress rupture, wear resistance, metallography, transmission and scanning electron microscopes, electron microprobe, X-ray diffraction, and various electrical conductivity measurements.

EXPERIENCE: A large portion of Sherritt's total metal sales go to the US which includes fabricated metal products, such as dispersion strengthened nickel and composite powders for turbine engines. The products, which may be used in military aircraft, are sold to engine manufacturers. Sherritt is interested in doing research for the USAF/US Army when the research area is consistent with their research objectives. Research and development projects have been carried under USAF contracts in the late 1960s and early 1970s. These contracts were in the area of dispersion strengthened nickel-chromium alloys. The research specifically dealt with improved oxidation resistance and mechanical properties.

REVISED: Mar 90

SHL SYSTEMHOUSE Inc

ADDRESS: Suite 501
50 O'Connor Street
Ottawa, Ontario
Canada K1P 6L2

CONTACT: Mr Peter Sandiford, President and Chief Operating Officer
Tel: (613) 236-1428
Fax: (613) 236-2043

KEYWORDS. Computer Systems Integrator, Communication Systems Integrator, Systems Support, Systems Integration, Information Systems, Facilities Management, Fault-Tolerant Systems, Voice and Data Integration, Imaging Technology, Optical Storage Technology, Specifications Development.

HISTORY: SHL Systemhouse Inc is a Canadian-owned, systems integration company with corporate offices based in Ottawa, Canada. Founded in 1974, Systemhouse has become one of the world leaders in computer systems integration with branch offices located across Canada, the United States, and Europe.

CAPABILITY: SHL Systemhouse Inc is a full service computer and communications systems integrator. Delivering complex systems and micro-computer integration products and services to meet the specific needs of business and government organizations in Canada, the United States, and internationally. The outstanding success of the company is attributed to its ability and commitment to provide the most effective solution for each customer. Given the complex technological possibilities available, Systemhouse works with its customers to identify, evaluate, and recommend technologies that are best suited for the customers' needs.

AVERAGE WORK FORCE: 3200

GROSS SALES: 1988 - \$230.1M
1989 - \$630.8M

PLANT SIZE: No data.

EQUIPMENT: No data.

EXPERIENCE: The company's list of clients include Canadian governmental organizations of the Department of National Defence, National Capital Commission, Canada Post Corporation, Tax Court of Canada, Public Archives, Ministry of Transport, Supply and Services, and the provinces of British Columbia through to Newfoundland. Canadian commercial customers include Petro Canada, Bell Canada, Gemini Group, McCain Foods, Northern Telecom, Stanfield's Limited, Imperial Tobacco, Dofasco Inc, Somerville Packaging, BP Canada, and Nova Corporation. SHL Systemhouse has performed services for the following US government organizations: US Navy, US Marine Corps, US Air Force, Treasury Department, US Health and Human Services, and the Customs Service. United States commercial customers include AMEX, Amtrak, Safeway, Intel Rail, US Sprint, Ameritech, Raley's, and McDonalds.

REVISED: Apr 90

SIGNA-FLASH Ltd

ADDRESS: 9 Taymall Avenue
Toronto, Ontario
Canada M8Z 3Y8

CONTACT: Penny Simmons, Vice President
Tel: (416) 255-5469
Fax: (416) 252-8829

KEYWORDS: Strobe Light; Marine Signalling Devices; Flares; Personnel Locating Devices; Visual Signalling Devices; Runway Markers; Helipad Markers; Life Jacket Lights.

HISTORY: Signa-Flash is a family-owned, Canadian company founded in 1979 by Mr A H Simmons. Mr Simmons started Signa-Flash after retiring his position as founder and 20-year president of Braun Electric (Canada) Ltd.

CAPABILITY: Signa-Flash is primarily involved in the creation, design, and manufacture of a line of portable, battery-operated strobe lights, in particular, the pocket-sized MAY-DAY. The MAY-DAY features a dual on/off switch; that is, it can be actuated either manually or by its completely automatic water-activated switch. As well as flashing intermittently, the larger, double-barrelled Signa-Flash strobe light flashes the Morse code SOS. Both lights are intended as alternatives or complements to roadside or marine flares and use regular batteries.

The company has also demonstrated their capabilities in the recent design of a portable sequenced runway lighting system that has analog and digital design capabilities as well as CAD capabilities, electronic and mechanical.

AVERAGE WORK FORCE: Technologist - 1
Others - 4

GROSS SALES: No data.

PLANT SIZE: No data.

EQUIPMENT: No data.

EXPERIENCE: Present customers include various departments of the Canadian Government, National Defence and Transport Canada, and industries in Canada, the US, and abroad. Two US companies utilize one strobe component in their finished products. As well, the portable, battery-operated strobes are being reviewed in Canada for use as portable helipad locator beacons. MAY-DAY holds Canadian Coast Guard approvals and recently acquired US Coast Guard approval to SOLAS standard 74/83.NSCM 38852.

REVISED: Mar 90

SKYWAVE ELECTRONICS Ltd

ADDRESS: 300 March Road, Suite #304
Kanata, Ontario
Canada K2K 2E2

CONTACT: Mr E Isaak, Director, Marketing
Tel: (613) 592-0908
Fax: (613) 592-2104

KEYWORDS: Satellite Terminals; Voice & Data Communications; Digital Signal Processing; Air/Ground Data Links; HF Radio; Modems; RF Communications; Telephone Communications.

HISTORY: SkyWave is a Canadian-owned, high-technology company specializing in digital signal processing for radio and satellite communications. Founded in 1984, it is located in the Kanata Industrial Park.

CAPABILITY: SkyWave is principally involved in the design and manufacture of state-of-the-art voice and data communications equipment for radio and satellite communications, particularly for airborne, mobile, and transportable systems. Their main products are:

- Satellite Voice/Data Channel Unit - Model SCU-1
- Suitcase Satellite Voice/Data Terminal - Model KSST-1 and CSST-1
- Briefcase Satellite Voice/Data Terminal - Model LBT-1
- 2400/4800 bps Vocoders - Model LPC-357
- NAVLINK (air-to-ship) Data Link
- Digital Squelch/Vox Unit for HF Radio

AVERAGE WORK FORCE: PhDs - 1
Engineers - 13
Others - 7

GROSS SALES: 1989 - \$3.0M

PLANT SIZE: 4,000 sq ft

EQUIPMENT: SkyWave maintains well equipped engineering development facilities for DSP, RF, and digital engineering, and computer facilities - IBM, Macintosh, TMS 320/32020/320C25, V40, and 68HC11.

EXPERIENCE: SkyWave's present customers include various departments in the Canadian Government, UK, and Australia, and commercial customers in the US, Spain, Austria, Korea, Taiwan, and PRC.

REVISED: Mar 90

SOFTWARE KINETICS Ltd

ADDRESS: 65 Iber Road
Stittsville, Ontario
Canada K2S 1E7

CONTACT: Mr Tony Moretto, Director-Sales and Marketing
Tel: (613) 831-0888
Fax: (613) 831-1836

KEYWORDS: Electronic Warfare; Electronic Support Measures; Data Acquisition; ATC Systems; Flight Information; Display Systems; Systems Analysis; Data Processing; Weather Radar; Radar Data Processing Systems; Real-Time Systems; Data Command and Control; Sensor Integration; Military Message Handling; Tactical Network Communications; Ada Software.

HISTORY: Software Kinetics is a Canadian systems and software engineering company specializing in aerospace, defense, communications, and real-time and advanced software technologies. The company was founded in 1981 and currently employs over 100 professionals in its head office in Stittsville (near Ottawa) and its two branch offices (in Toronto, Ontario and Halifax, Nova Scotia). The company is federally incorporated and is entirely owned by its employees.

CAPABILITY: No data.

AVERAGE WORK FORCE: Eng - 80
Others - 20

GROSS SALES: 1988 - \$4.2M
1989 - \$5.3M

PLANT SIZE: 21,000 sq ft (Ottawa)
2200 sq ft (Halifax)
200 sq ft (Toronto)

EQUIPMENT. TEMPEST shielded computer room, in-house computer system includes VAX, UNISYS, SUN, and IBM.

EXPERIENCE: Present customers include several departments in the Canadian Federal Government: Department of National Defence, Defence Research Establishment Ottawa, Department of Communications, Communications Research Center, Energy Mines and Resources, National Research Council, Transport Canada, Department of Public Works, and Atomic Energy Control Board.

Within the defense and aerospace sector, Software Kinetics has been a qualified subcontractor with Sperry (Defence Products Group), Westinghouse Canada, Litton Systems Canada, Computing Devices Canada, Pratt and Whitney, Canadian Marconi Company, and EHI Canada.

Software Kinetics has also worked with several high-technology companies including Bell Northern Research, Gandalf Data Systems, DY-4 Systems, Honeywell, Systemhouse, Digital Equipment Corporation, and IBM (Federal Systems Division).

REVISED: Apr 90

SPAR AEROSPACE Ltd

ADDRESS: Suite 900
5090 Explorer Drive
Mississauga, Ontario
Canada L4W 4X6

**Government Relations Office*
222 Queen Street, Suite 402
Ottawa, Ontario
Canada K1P 5V9

Satellite and Communications Systems Division
21025 Trans-Canada Highway
Ste-Anne-de-Bellevue, Quebec
Canada H9X 3R2

Remote Manipulator Systems Division
1700 Ormont Drive
Weston, Ontario
Canada M9L 2W7

Defence Systems Division
1235 Ormont Drive
Weston, Ontario
Canada M9L 2W6

Defence Systems Division
PO Box 13050
Kanata, Ontario
Canada K2K 1X3

Gears & Transmissions Division
825 Caledonia Road
Toronto, Ontario
Canada M6B 3X8

Aviation Services Division
7785 Tranmere Drive
Mississauga, Ontario
Canada L5S 1W5

Subsidiaries:

Astro Aerospace Corporation
6384 Via Real
Carpinteria, California
USA 93013-2993

Commercial Telecommunications Corp (COMTEL)
2811 Airpark Drive
Santa Maria, California
USA 93455

CONTACT. *Mr D W Stapley, Director, Government Business Development
Tel: (613) 563-0230
Fax: (613) 563-4284

KEYWORDS. Airframe Components, Antennas, Communications, Control Systems, Electro-Optics, Engine Components, FLIRs, Gear Boxes, Ground Stations, Helicopter Subsystems, Infrared Systems and Instrumentation, R&O (Aircraft), R&O (Avionics), Remote Manipulator Systems, Remote Sensing; Satellite Subsystems; Satellites; Space Based Radar; Space Systems, Structures, Telerobotic Products, Transmissions.

HISTORY. Spar commenced operations as a public company in January 1968, following the acquisition of the Special Products and Applied Research (SPAR) Division of The deHavilland Aircraft of Canada Ltd. The company developed by internal growth and through acquisitions including:

- 1969 - The assets of York Gears Ltd.
- 1972 - Astro Research Corporation of California, now Astro Aerospace Corporation.
- 1977 - The assets of the Government and Commercial Systems Division of RCA Ltd and certain assets of the space electronics manufacturing unit of Northern Telecom Ltd.
- 1984 - COMTEL of California.

CAPABILITY: Spar Aerospace Limited is a Canadian-owned company engaged in the design, development, manufacture, and servicing of systems, subsystems, and products for the space, communications, defense, aviation, and remote manipulator markets. The company employs over 2000 people of which more than 700 are engineers and technicians, one of the largest technological groups in the private sector in Canada.

In twenty years of growth, Spar has gained international recognition as a diversified, high-technology company and has achieved financial stability by balancing the steady sales base of its gears and transmissions and aviation services operations with businesses serving the fast-growing markets of space, defence, communications, and telerobotics. Spar's areas of expertise are outlined below:

- SPACE - Spar's facility in Ste-Anne-de-Bellevue near Montreal is the principal supplier in Canada and a major international manufacturer of communications and surveillance systems, including satellites and satellite subsystems.

Spar and its predecessor companies have contributed to the design and manufacture of over 50 satellites and subsystems,

including the fabrication of structures and payloads for all Canadian satellites and many international programs. The company's contract from Telesat Canada in 1979 to supply two 24-channel *Anik D* communications satellites was the first such prime contract to be granted to a Canadian company. *Anik D1* was successfully launched in August 1982, and *Anik D2* was launched in 1984. The building of the *Anik E* series communications satellites is currently underway for launch in 1990/1991.

In 1982, Spar was awarded a prime contract to provide two satellites and a related ground control system for EMBRATEL, the Brazilian government-owned telecommunications company. This is the largest export satellite contract won by Spar and is the first domestic communications satellite system in Latin America. In addition to pursuing the second generation communications satellites for Brazil, Spar is working on many other major communications satellite projects including Intelsat VII, Telecom II, Olympus, MSAT, and Radarsat, a remote sensing satellite to be employed by the Canadian Space Agency.

Spar's subsidiary Astro Aerospace Corporation, designs and develops lightweight, deployable structures for space and ground applications. These include the patented STEM antenna product line and Astromast deployable structures used in many spacecraft to deploy antennas, experiments, and solar arrays.

- **COMMUNICATIONS** Spar designs and manufactures satellite earth stations and related projects. The development of the Time Division Multiple Access/Digital Speech Interpolation (TDMA/DSI) equipment which was largely completed during 1983 is undergoing continuous improvement. The first terminal was delivered to Teleglobe Canada in 1984. The system has received wide acceptance in several international markets. This system, together with Spar's satellite capability, allows the company to provide complete service, both space and ground segments, including overall systems architecture to its customers.

Spar's subsidiary, COMTEL, designs and builds light and medium rate earth station nets for such customers as Dow-Jones Inc, NASA, and US Defense Department.

- **DEFENSE** - Spar develops and manufactures electro-optical, surveillance, and telerobotics for the Canadian Armed Forces and international markets. It also provides technical support to the forces, particularly systems engineering. Facilities include a manufacturing plant, optical, electronics and systems laboratories, and a dedicated computer for developing military software and the real-time processing and display of complex optical data.

Spar is a leader in the field of infrared technology, with its AN/SAR 8 infrared surveillance system for the passive detection of ships, missiles, and aircraft for defense and navigation purposes. Following successful trials of the system by the Canadian and US Navies, a project agreement was signed by the two governments in 1983 to undertake, on a joint basis, the full scale engineering development of this equipment. This development activity is nearing completion with the AN/SAR 8 now approaching the production phase.

Spar is manufacturing the Forward Looking Infrared (FLIR) system for the Canadian Forces Low Level Air Defence System and, in addition, offers several configurations of FLIR devices for land and airborne applications for both Canadian and export markets.

- **AVIATION PRODUCTS** - Spar is an industry leader in the production of high precision aerospace gears and transmissions. The company manufactures and assembles lightweight, high-speed, high-torque, power transmission systems and equipment for gas turbine engines and fixed and rotary wing aircraft. This facility also manufactures, assembles, and tests the joints of the Remote Manipulator System (RMS) for the Space Shuttle.

In 1982, Spar signed an initial contract with Sikorsky Aircraft to produce the main, intermediate, and tail gearboxes for the Sikorsky H-60 series helicopter. As well, the company

manufactures the tail rotor, intermediate gearboxes, and main rotor shafts for the Sikorsky S-76 commercial helicopter as well as the power input modules for Blackhawk helicopters.

Spar produces accessory gearboxes for General Electric's J85-21 turbojet engine (used in the F-5E/F aircraft), the T700 turbo-shaft engine (used in the Black Hawk, Sea Hawk, Advanced Attack, and Bell 214ST helicopters), and the CT7 turboprop engine variants. Engine gearboxes are supplied for General Electric's new J79-17X engine development program, the CF6-80 commercial transport engine and for the CFM56 turbofan engine, a joint project of General Electric and SNECMA of France. Gearbox components are also manufactured for Avco Lycoming's T53, T55, and ALF 502 engines.

The company fabricates the transmission and components for the Boeing Vertol CH-46 helicopter, transmission gears for the Westland Lynx helicopter (UK), and gear box components for the Puma helicopter made by Aerospatiale of France.

- **AVIATION SERVICES** - Spar repairs and services aircraft components, sells aviation products and accessories, and overhauls helicopters.

Services cover engine and flight instruments, components of electrical, oxygen, navigational, and autopilot systems; constant speed drives, accessory gearboxes, and components for flight control and heating systems. Customers are military and commercial operators in Canada, the US, Mexico, Central and South America, Africa, and the Far East. A large part of Spar's business is with 17 aircraft equipment manufacturers in North America and Europe which have appointed the company as a Canadian warranty and service center for their products. Spar is also involved in the repair and overhaul of a number of components for the NATO E3A AWACS fleet.

For helicopters, Spar provides an authorized customer service facility for Bell, Aerospatiale, and Hughes. Services include the sale of parts and accessories, the repair and overhaul of mechanical, hydraulic, and avionics components, rebuilding and maintaining airframes; and providing field service to customers in all major export markets.

- **REMOTE MANIPULATORS** - The Canadarm, the original remote manipulator system (RMS), was successfully tested for the first time on the Space Shuttle "Columbia" in November 1981 and continues to perform flawlessly on space flights. It was produced in Canada under the agreement between the National Research Council of Canada (NRCC) and NASA. Spar was the prime contractor to NRCC for the design, development, and manufacture of this flight system. Spar continues to supply additional RMS's on an as-required basis.

Spar, under a contract from Ontario Hydro, designed and delivered a remote manipulator and control system to replace and repair fuel tubes in nuclear reactors. In addition, Spar, Ontario Hydro, and the Canadian Fusion Fuels Technology Program are engaged in the concept definition stage of a project to apply remote manipulator technology to the Tokamak fusion reactor project in Princeton, New Jersey. Using similar technology, under an MOU with Inco, Spar has developed a remotely controlled and operated rock bolter. Finally, Spar is the prime contractor for the mobile servicing system (MSS) which is Canada's contribution to Space Station Freedom.

AVERAGE WORK FORCE. Engineers & Technicians - 700
Others - 1400

GROSS SALES: 1988 - \$275M
1989 - \$233M

EQUIPMENT: See discussion above under "Capability."

EXPERIENCE. See discussion above under "Capability."

REVISED: Mar 90

SPARTON OF CANADA Ltd

ADDRESS: 99 Ash Street
London, Ontario
Canada N5Z 4V3

CONTACT: Mr Bruce Eidsvik, Manager Government/Military
Business Development
Tel: (519) 455-6320
Fax: (519) 452-3967

KEYWORDS: ASW; Acoustic Sensing; Active Sonobuoys; Bathythermographs; BT Sonobuoys; Environmental Sensors; Geophysics; Hydrophones; Ice Penetration; Oceanographic Products; Passive Sonobuoys; Power Supplies; Sonobuoys; Underwater Ring Shell Sound Projectors

HISTORY: Sparton, incorporated under Federal charter in 1930, is a wholly-owned subsidiary of Sparton Corp, Jackson, MI.

CAPABILITY: Sparton specializes in the development, engineering, and manufacture of specialized electronic products for the military, industrial, and original equipment manufacture (OEM) markets. Their R&D activities include development of microbuoys; expendable bathythermal systems, new, improved, low-noise, passive sonobuoys; depth-compensated ring shell acoustic projectors; ice penetration systems; and switch-mode electronic power supplies

Sparton's Engineering Department staff covers professional disciplines of electrical/electronic engineering, mechanical engineering, physics, hydro-dynamics, and hydroacoustics. They are experienced in the preparation and management of engineering projects from proposal through to implementation (development, specifications, testing, and production).

Sparton of Canada Ltd is a qualified producer meeting the requirements of DND 1015 and US MIL-Q-9858A quality assurance programs. There is a resident military QC detachment on the premises. Sparton is cleared by DSS Industrial Security for projects up to SECRET classification. Current product lines are active and passive sonobuoys for military customers, acoustic projectors, and switch mode and linear power supplies for large and small computer systems.

AVERAGE WORK FORCE: Production - 41
Engineering Dept:
PhD - 1
MSc - 2
BSc - 8
Technologists - 19
Technicians - 14

GROSS SALES: 1988 - \$23.7M
1989 - \$8.8M

PLANT SIZE: 28,000 sq ft

EQUIPMENT: Sparton's engineering facilities include fully equipped laboratories; hydrodynamic test tank; RF-shielded rooms; computer terminal access to a wide range of engineering software including FF2E, SPICE, and OSCAR, two IBM 370 systems, and two Perkin Elmer Corporate computers.

EXPERIENCE: Sparton is a supplier of passive sonobuoys to the Canadian Government, active sonobuoys (AN/SSQ62B) to the Canadian Government, to the US Navy, and to other overseas users; OEM supplier of various types of regulated power supplies to Canadian manufacturers; responsible for the supply of Depth Compensated Ring Shell Projectors and BT systems; is now in the development stage of an ice penetration sonobuoy; and is also developing variants of Ring Shell Sound Projectors. Applications for the latter device are anti-submarine warfare (ASW) crew training, dipping sonar, towed array active adjunct, and scientific investigations of ocean sound propagation characteristics or sound detection systems.

REVISED: Mar 90

SPECIALIZED WELDING & FABRICATION Ltd

ADDRESS: 1173 North Service Road West, Unit D10
Oakville, Ontario
Canada L6M 2V9

CONTACT: Mr J Lawrence McNutt, President and General
Manager
Tel: (416) 847-7278
Fax: (416) 847-7299

KEYWORDS: Airframe Components, Engine Components; Fluorescent Penetrant Inspection, Inspection, R&O (Components), Radiographic Penetrant Inspection, Welding; X-Ray Inspection; Magnetic Particle Inspection.

HISTORY: Specialized Welding and Fabrications Ltd is a Canadian-owned company founded in 1964.

CAPABILITY: Specialized Welding and Fabrication Ltd provides a special service of welding, custom fabricating, and radiographic, fluorescent penetrant, and magnetic particle inspection to the aircraft and allied industries. Working to quality controls and procedures designed specifically to meet the requirements of the Department of National Defense and the Department of Transport, Air Services Branch, ensures that product quality is always acceptable. The exceptional skill and versatility demanded of the staff is achieved through in-plant training and the experience of working with a wide variety of aircraft materials. Only fully certified material is used, and all shipped material is certified as having been processed and inspected to the appropriate specification

AVERAGE WORK FORCE: Management - 2
Accounting - 1
Production - 4
Inspection - 2

GROSS SALES: 1988 - \$400K
1989 - \$400K

PLANT SIZE: 9,000 sq ft

EQUIPMENT: Welding - 300 amp AC/DC welding machines, Cobramatic GMAW machine; Fabricating - Shear, press brake, notcher, turret punches, drill press, sanding equipment, Vapour degreaser, and hand tools; Inspection - Phillips 300Kv constant potential X-ray machine, Magnaflux 400 amp wet bench, and fluorescent and dye penetrant equipment.

EXPERIENCE: Present customers include Air Canada, Boeing of Canada (deHavilland Division), Dowty Equipment of Canada Ltd, Garrett Canada, Genaire Ltd, Haley Industries, Lucas Aerospace, IMP Group Ltd (Aerospace Division, Spar Aerospace Ltd, Tube-Fab Ltd, Wardair Canada Inc, and Walbar of Canada Inc. Much of the work for these companies is under government contract.

REVISED: Mar 90

SPECTRUM SIGNAL PROCESSING INC

ADDRESS: In Canada:
Suite 301, Discovery Park
3700 Gilmore Way
Burnaby, British Columbia
Canada V5G 4M1

In Eastern US:
460 Totten Pond Road - 4th Floor
Waltham MA 02154
Tel: (617) 890-3400
Fax: (617) 890-0176

In Western US:
264 H Street
PO Box 8110-25
Blaine WA 98230
Tel: 800-663-8986

CONTACT: Mr Michael Mertens, President and CEO
Mr Barry Jinks, Vice President, Sales and Marketing
Tel: (604) 438-7266
Fax: (604) 438-3046

KEYWORDS Signal Processing, Digital Signal Processing, DSP, PC/XT/AT Bus, VME Bus, Plug-in Computer Boards, DSP Development Systems, DSP Software Development, DSP Development Tools, Data Acquisition, Real-time Computing

HISTORY Spectrum Signal Processing Inc is a Canadian company founded in August 1987 with the head office located in Burnaby, British Columbia, and a regional sales office in Waltham, Massachusetts. Its principal business is the design, manufacture, and sale of Digital Signal Processing (DSP) computer boards and software development tools for the PC/XT/AT bus and VME bus. Spectrum also provides applications consulting and the ability to customize hardware products for particular applications. Depending on the opportunity, Spectrum may undertake custom design and manufacturing contracts.

Spectrum's products are general purpose, addressing applications ranging from electronic warfare, image processing, vibration analysis to speech recognition, digital audio and seismic analysis.

CAPABILITY: Development Tools: Spectrum supplies the widest range of development tools for single-chip DSPs supporting processors from Texas Instruments, Motorola, AT&T, and Analog Devices. These tools are complete with PC plug-in boards, monitor/debuggers, C interface libraries, assemblers, C compilers, data acquisition software, and filter design software.

Applications Consulting: Spectrum's staff of applications engineers are available to assist customers with leading-edge implementations of digital signal processing. This includes algorithm design, hardware prototyping and layout, system integration, and project management services.

OEM Products: Spectrum supplies off-the-shelf DSP systems for the PC and VME-bus which can be customized for specific customer needs.

AVERAGE WORK FORCE: Electrical Engineers - 3
Technologists - 3
Marketing - 5
Management/Admin - 7

GROSS SALES: 1988 - \$1.5M
1989 - \$2.4M

PLANT SIZE: Burnaby BC - 4,000 sq ft
Waltham MA - 1,100 sq ft

EQUIPMENT: Lab equipment for commercial grade QA, prototyping, and repairs.

EXPERIENCE: Spectrum sells 40% of its products to DOD, DND, and military prime contractors, 40% to companies specializing in medical electronics, telecommunications, professional audio, and industrial control, and 20% to universities and research institutes. About 80% of sales are exported to the United States.

REVISED: Mar 90

SPIECE ASSOCIATES INC

ADDRESS: 59 Shearwater Bay
Winnipeg, Manitoba
Canada R3T 4V8

CONTACT Mr E L Spiece, President
Tel: (204) 261-7452

KEYWORDS Economic Studies, Management Consulting, Market Research, Program Management, Risk Analysis

HISTORY. Spiece Associates was founded in 1979 to provide task-oriented management and consulting services to the global high-technology industries.

CAPABILITY: Spiece Associates is capable of providing high technology companies and government agencies involved with high technology industries with a full selection of task-oriented management and consulting services. Services provided include project management, strategic planning, project/program audits, project risk analyses, economic feasibility studies, cost location studies, marketing research, industrial development assistance, proposal preparation, preparation of business plans, etc. Spiece Associates personnel are also available for marketing, strategic planning, and business development management positions within governments and industry on a short-term contract basis.

AVERAGE WORK FORCE: MBA - 1
BSc - 2
Other - 1

All personnel are experienced in the aerospace and other high technology industries.

GROSS SALES: 1988 - \$0.3M
1989 - \$0.3M

PLANT SIZE: No data.

EQUIPMENT: No data.

EXPERIENCE: Aerospace business clients include prime manufacturers, component and systems manufacturers, service companies, and government departments and agencies in Canada, the US, and Western Europe.

REVISED: Mar 90

SPILSBURY COMMUNICATIONS Ltd

ADDRESS: 1495 Franklin Street
Vancouver, British Columbia
Canada V5L 5B6

CONTACT: Mr Robert C Mountfort, Vice President
Tel: (604) 254-6411
Fax: (604) 254-2080

KEYWORDS: Antennas; Beacons; Center-Loaded Antennas; Communications; Digital Voice Repeaters; Digital Voice Loggers; Fixed Radios; HF Antennas; HF Radios; HF Whip Antennas; Low Frequency Beacon Systems; Mobile Radios; Navigation; Navigation Aids; Non-Directional Beacon Systems; Radiotelephone Equipment; Single Sideband Radios; VHF/FM; Variable Tuned Antennas.

HISTORY Spilsbury is a Canadian-owned company incorporated in 1941. Spilsbury is the major shareholder of RACE Technologies Inc, a sister company which operates from the same address and specializes in adaptive HF radio controllers and high speed fax modems for HR radio.

CAPABILITY: Spilsbury specializes in radiotelephone equipment, antennas, and navigational aids for long-range frontier and coastal marine communications. The company develops and manufactures HF single-sideband radio communication equipment for land and marine use, fixed and mobile. They are also concerned with the overall concept of providing a system of communications rather than with the manufacture of specific units. One of the major areas of innovation in this field has been the design of a unique series of antennas which increase the effective communicating power of a radio by ten to fifteen times over a conventional installation. These Spilsbury, center-loaded, variable tuned, HF, whip antennas are used in portable, mobile, and fixed service on land, sea, and air. In addition to the above, Spilsbury manufactures VHF/FM radiotelephone equipment for mobile and fixed station, land or marine use (Autotel and IMTS). Other specialized equipment includes low frequency, non-directional beacon systems for medium range aeronautical

or marine navigation installations. Spilsbury builds a complete line of digital voice repeaters for instant recall of telephone or radio messages.

AVERAGE WORK FORCE: Professional (Technical) – 16
General Assembly – 15
Others – 25

GROSS SALES: 1988 – \$4.0M
1989 – \$4.0M

PLANT SIZE: 60,000 sq ft

EXPERIENCE: Spilsbury equipment is used in over 50 countries including the US.

REVISED: Mar 90

STANDARD AERO Ltd

ADDRESS: 33 Allen Dyne Road
Winnipeg International Airport
Winnipeg, Manitoba
Canada R3H 1A1

CONTACT: Mr Paul Soubry, Director, Government Contracts
Tel: (204) 778-2754
Fax: (204) 783-2878

KEYWORDS: Aircraft Engine and Accessory Overhaul; R&O (Engines); Component Repair Development.

HISTORY: Standard Aero Ltd is Canada's largest independent aircraft engine overhaul facility. The company was started in 1938 overhauling reciprocating engines, turbine engine overhaul began in 1960. In 1989, Standard Aero was purchased by Hawker Siddeley Plc, a diversified international company with headquarters in London, England.

CAPABILITY: Standard Aero's head offices and overhaul facilities are located at the Winnipeg International Airport. With an experienced and dedicated work force of over 650 technical and support staff, Standard Aero is well positioned to meet the needs of both its commercial and military aviation customers. Trained service technicians provide expert repair and overhaul services for the following gas turbine engines

- Allison T63/250 series (turboshaft)
- Allison T56/501 series (turboprop)
- Allison 501 series (industrial)
- Lycoming T53 series (turboshaft)
- Lycoming T55 series (turboshaft)
- General Electric T58 series (turboshaft)
- Pratt & Whitney Canada PT6A series (engines)
- Sundstrand Turbomach T62 series (APUs)
- And all related accessories

In addition to the overhaul facility in Winnipeg, Standard Aero's North American operations include a network of regional service centers in Dallas, Texas; Van Nuys, California; Charlotte, North Carolina; Vancouver, British Columbia; and Montreal, Quebec.

Allison Gas Turbines has appointed Standard Aero as a T56/501D flight distribution/501K industrial major repair centre for North America, and through its London, England, operation, for the European market.

An international branch in Bellevue, Washington, exports parts and overhaul services to all seven continents. Foreign commercial and military customers rely on Standard Aero to supply them with specialized parts from over 2000 manufacturers.

Standard Aero has complete engineering, quality control, parts remanufacturing, field services, and test facilities to support our worldwide customer base.

AVERAGE WORK FORCE: Engineers/Technicians – 47
Mechanics/Technicians – 162
Support Personnel – 450

GROSS SALES: 1988 – \$137M
1989 – \$131M

PLANT SIZE: 270,000 sq ft

EQUIPMENT: Complete in-house parts rework facility including thermal and plasma spray, turning, grinding, EDM equipment, as well as furnace braze and heat treating capabilities. Complete publications department including state-of-the-art, desk top publishing and offset printing.

EXPERIENCE: Standard Aero operates under Canadian Department of Transport approval No. 22-58, and NATO's highest standard, AQAP-1, which is the equivalent of MIL Q-9858. FAA approval is automatic as a result of the Canadian/American bilateral agreement ETT-1583.

REVISED: Mar 90

STEVESTED MACHINERY & ENGINEERING Ltd

ADDRESS: 7943 Progress Way
Tilbury Industrial Park
Delta, British Columbia
Canada V4G 1A3

CONTACT: Mr I Z (Steve) Lovas, President
Tel: (604) 946-7621
Fax: (604) 946-7317

KEYWORDS: Machining; Precision Machining; Welding (Advanced); CNC Machining; CAD/CAM; CAM.

HISTORY: Stevested Machinery & Engineering Ltd was established in 1970. The main focus has been on precision machining from conception. The company moved to its present location in Tilbury Industrial Park in 1979 where it has now 49,000 sq ft of working area.

CAPABILITY: The company is one of the most advanced machine shops in Western Canada and capable of handling anything from medium to large complicated aircraft parts and assemblies required by today's aerospace industries. During recent years, Stevested purchased a large true-5-axis machining center and a large 3-axis turning center. Both these machines are designed specifically to handle the machining challenges of sophisticated parts encountered in the aircraft industry. The other CNC equipment purchased in the past is quite standard in a technologically advanced machine shop. The machines are programmed by our new McDonnell Douglas Unigraphics II CAD/CAM Programming System.

The company's Quality Assurance Program has been refined thoroughly to meet US and Canadian military specifications. At present, Stevested Machinery & Engineering Ltd is approved by Bell Helicopters, Raytheon, Litton Systems, and Boeing of Seattle.

AVERAGE WORK FORCE: Office Staff – 5
QA Manager – 1
Others – 19

GROSS SALES: 1988 – \$1.7M
1989 – \$2.2M

PLANT SIZE: 49,000 sq ft

EQUIPMENT: CNC machining (large parts, small quantities); CNC production (smaller parts, large quantities); general machining (large turned parts to 13.5 ft); general machining (large horizontal boring mill parts), fabricating to 20,000 lbs (steel & stainless); and detail & production engineering facilities.

EXPERIENCE: Stevested Machinery & Engineering Ltd's customer list includes:

- BC Research (Div of Fleet Aerospace) – Prototype work on compensating bases for satellite receiving antennae.

- Boeing Commercial Aircraft – High precision aircraft parts
- CAE Machinery – Components for pulp and paper equipment.
- Canadian Airlines International – Machine and assemble ground support equipment
- Conair Aviation – High precision firefighting aircraft parts.
- Johnson-Matthey Ltd (Cominco) – Fabricate components for high purity metals refinement equipment
- Lips Canada – Marine industry items. High precision work on propellers and shafts.
- Moli Energy – Machine aluminum parts and fabricate for battery production.
- Osborne Propellers – Marine industry items. Precision machining on propellers and shafts.
- Sunds Defibrator Ltd – Pulp and paper equipment. 5-axis machining center complexity. Extremely high precision and repeatability requirements.
- Triumph, UBC – Cyclotron parts & prototype work for experimental purposes. Very high precision requirements.
- Westcoast Manly Shipyards – Machining on components for proprietary marine drives. Work on sea-going navigation systems.

REVISED: Mar 90

STRITE INDUSTRIES Ltd

ADDRESS 298 Shepherd Avenue
Cambridge, Ontario
Canada N3C 1V1

CONTACT: Mr Joseph D Strite, President
Tel: (519) 658-9361
Fax: (519) 658-6925

KEYWORDS: Avionics Components, CAM; Machining; Components Avionics, Gyros, Inertial Navigation Components, Instrumentation Components, Landing Gear Components, Thread Grinding

HISTORY: Strite Industries is a private Canadian-owned small business. The company was incorporated in 1964 to serve the US avionics industry. For over 25 years, the company has been a major supplier of gyro and accelerometer hardware.

CAPABILITY: Strite specializes ultra precision machining of small and medium-sized close-tolerance, precision components and assemblies for the aerospace, defense, electro optic, hydraulic, and other high-technology industries. The company has total machining, assembly, and treatment facilities including engineering, prototype, and high-volume production capabilities. The company's products range from aluminum housings to miniature gimbals to spools and sleeves. Materials include aircraft aluminum, high nickel alloys and titanium. Strite's quality control system meets MIL-7-9858A standards and has been approved by major aerospace and defense contractors.

AVERAGE WORK FORCE: Engineers – 2
Technicians – 8
QC Personnel – 15
Production – 280

GROSS SALES: 1989 – \$12.5M

PLANT SIZE: 74,000 sq ft

EQUIPMENT Strite Industries is the largest and most up to-date manufacturing facility of its kind in North America using the best equipment available from USA, European, and Japanese machine tool

manufacturers. Much of the equipment is CNC controlled, and CAM is used extensively. In addition to common machining processes, the company also has machining centers, machinery for broaching, EDM machining, thread grinding, plating and finishing, as well as an extensive range of inspection equipment. The company regularly updates its methods to ensure that it remains on the leading edge of machining technology.

EXPERIENCE: Strite Industries has been a supplier of strategic high-precision, machined products to the US aerospace and defense industry since 1964. The company excels at developing solutions for the most challenging components. The company's background in original equipment manufacture makes it an excellent source of supply, particularly for R&O and retrofit gyro components. The company's objective is to become a source of spares supply for the US military for components previously manufactured by Strite for prime contractors.

REVISED: May 90

T R COX AEROFOILS Ltd

ADDRESS: 2170 Speers Road
Oakville, Ontario
Canada L6L 2X8

CONTACT: Mr T Ron Cox, President
Tel: (416) 825-1218
Fax: (416) 825-1220

KEYWORDS: Machining; Precision Machining; Engine Components; CNC Machining; Components (Engines); Tool Fabrication Components (Aircraft).

HISTORY: Accurate Stamp was purchased in 1969 by Joan and Ron Cox. The company was incorporated in 1977 with the concentration on toolmaking. In 1978, there was further concentration on aircraft gas turbine engine research and development. The name was changed in 1984 to T R Cox Aerofoils Ltd to reflect thrust of our work. We have progressed significantly in this field.

CAPABILITY. T R Cox Aerofoils Ltd is a tool-making operation specializing in the manufacture of air foils connected with gas turbine engines, eg compressor blades, turbine blades, vane rings, fan blades, stators for core and bypass.

The company specializes in short and medium runs of blade sets of the above. The company manufactures jigs, fixtures, and tool-making requirements associated with the development of engines, including fir tree forms and disks.

T R Cox Aerofoils manufactures flaps and air foil sections for air frame manufacturers up to a 20' x 20' x 40' envelope including propeller blade parts.

The company has the capability to manufacture production machined parts in any machinable material, including titanium, for such parts as de-icing manifolds, brackets, and similar parts. We manufacture parts using wire and sink CNC EDM.

AVERAGE WORK FORCE. Management – 2
Toolmakers, Machinists – 8
Admin – 1

GROSS SALES: 1988 – \$875K
1989 – \$916K

PLANT SIZE: 5,000 sq ft

EQUIPMENT: CNC Machining Centre – new 1989, complete with digitizer. Japax CNC wire EDM with 12" height clearance and X, Y, U, V axis complete with hole sinking unit, new 1987. Japax CNC Wire EDM, X, Y, U, V axis, new 1989. 1 die sink EDM Sparkatron No 1024 and 1 die sink EDM Sparkatron No ES200. Form measuring equipment, large capacity optical comparators, and digitizing equipment for reverse engineering.

EXPERIENCE. The company's customers include General Electric Aircraft Company (Lynn and Evandale), Pratt & Whitney Canada Inc (Mississauga and Longueuil), Canadair Inc (St Laurent), and Hawker Siddeley Canada Inc (Orenda Division).

REVISED: Mar 90

TARGA ELECTRONICS SYSTEMS Inc

ADDRESS: 18 Auriga Drive
Nepean, Ontario
Canada K2E 7T9

CONTACT: Mr Gavin McLintock, Chief Operating Officer
Tel: (613) 727-9876
Fax: (613) 727-1705

KEYWORDS: Bubble Memory; Computer Mass Memory; Data Loggers; Data Recorders, Floppy Disk Emulators, Mass Storage Systems, Memory, Peripheral Mass Storage, Removable Media Mass Storage Systems, Ruggedized Mass Storage Systems, Solid State Memory.

HISTORY. Targa Electronics Systems Inc is a Canadian company founded in 1981.

CAPABILITY. Targa Electronics is the manufacturer of ruggedized, solid-state, mass storage systems. Targa products provide small, low-powered, mass memory recording systems for hostile environments. By eliminating the use of mechanically rotated memory and substituting solid-state technology (e.g., bubble technology, E2PROM, CMOS RAM, etc), Targa is able to meet the demands of applications where the quality and value of data is of paramount importance. Their equipment is ideally suited to handle either the rigors of field work (land, air, and marine mobile) or the factory floor environment, while offering the convenience of small removable media cartridges of large capacity.

Targa offers several systems to meet different requirements.

- The DR-series data recorders are self-contained bench-top or rack-mounted data storage systems with a variety of interfaces, software protocols, and options.
- The FD4500 disk drive emulators are solid-state memory units that are compatible with most standard floppy disk controllers.
- The CH-series interface units are suitable as low cost data storage components for integration into systems. The units are available with R5232, 8-bit parallel, and SCSI interfaces.

Targa is also able to supply custom designs where the requirements are not met by the existing range of products.

AVERAGE WORK FORCE: Engineering - 10
Manufacturing - 10
Others - 10

GROSS SALES: No data.

PLANT SIZE: 6,000 sq ft

EQUIPMENT: In-house computer systems include DEC, IBM, Multibus, and Hewlett-Packard. Test equipment includes circuit emulation, oscilloscopes, etc., burn-in thermal cycling and test facilities.

EXPERIENCE. Targa products are used by the US Navy in dockside test equipment, deep sea rescue vehicles, flight line test equipment and memory loader/verifiers, and by the US Army in portable communications monitoring and chemical "sniffing" systems. They are also used by the armed forces of several countries including Great Britain and Australia. Targa products have been used in airborne flight inspection systems and helicopter-borne test equipment. Targa products are presently used in industrial applications by automobile manufacturers in mobile on-board vehicle tests, by the Canadian Government for both airborne and shipborne survey work, by portable computer manufacturers for ruggedized peripheral mass storage, and by offshore technology companies in support of oil well drilling. Targa has offices in San

Ramon, California, and Great Britain, and representatives or distributors throughout the US and Europe.

REVISED: Mar 90

TARGETAIR Ltd

ADDRESS: RR 4, D-268
Moncton, New Brunswick
Canada E1C 8J8

CONTACT: Mr Tim McEwen, Manager
Tel: (506) 857-2141
Fax: (506) 853-9182

KEYWORDS: R&O (RPV); RPV; Pilot Training (RPV); Consulting (RPV); Aerial; Aerial Target; Targets.

HISTORY. Targetair Ltd was formed in 1974 for the primary purpose of retrofitting F-86-E Sabre Jets for Flight System Inc, who in turn converted them to QF.86F drones for the US Army.

CAPABILITY. Targetair Ltd subsequently developed an additional line of target drones known as Targetair Aerial Target Series (TATS). The TATS have been used for a variety of weapon systems including the Short Bros. Blowpipe Missile, Oerlikon/Skyguard 35mm, Boffin 40 mm, and numerous small arms. In addition to the manufacturing of drones, Targetair offers a complete line of related services. Professional engineering & consulting services follow the progress of each specific design through research, development, and manufacturing phases. All flying, testing, and evaluations of RPVs are done by professional operators. Repair and overhaul services are available. Targetair offers an extensive five-week Drone Pilot Training School, biannually, at which operators are trained in the flying and maintenance of the TATS 1 (5 ft wing span, 80 mph) drones. Operator training is also available for the TATS 103 (12 ft wing span, 150 mph) drones. All manufacturing and flying facilities are located within a 144 acre private airfield in Moncton, New Brunswick.

AVERAGE WORK FORCE: Engineers - 2
Others - 16

GROSS SALES: No data.

PLANT SIZE: 17,200 sq ft

EQUIPMENT. Complete manufacturing facility to produce aerial target drones. Most of equipment is woodworking and composite related.

EXPERIENCE. Targetair Ltd is currently contracted with the Canadian Department of National Defence for supply and services related to military training with aerial target drones. Our systems have been in active service for over 12 years.

REVISED: Mar 90

TEAM Inc

ADDRESS: 2980 DIAB
Saint-Laurent, Quebec
Canada H4S 1M7

CONTACT: Mr Alain G Fouilloux, Vice President, Marketing
Tel: (514) 745-1600
Fax: (514) 745-2711

KEYWORDS: Data Acquisition, Data Processing, Intercom (Digital Analog), Sound Equipment, Centralized Control Units, Digital Warning Systems, Synthetic Voice, Failure Indicators, Selective Calling Systems; Audio Control Panel, Radio Management Panel

HISTORY. TEAM Inc (Telecommunications, Electronics, Aeronautics, and Maritime) is a Canadian owned, high technology, electronics company founded in 1985. It is a subsidiary of TEAM SA, a 35-year-old

French company. Created in 1951, TEAM has its own R&D department in its new premises in Rungis (France), a production unit in a modern plant in Troyes (France), and a commercial and industrial subsidiary in Montreal (Canada). TEAM SA has been supplying electronic equipment and computing systems for aircraft, ships, trains, communications, and industry for 35 years.

CAPABILITY. TEAM is primarily involved in the design and manufacture of airborne analog and digital intercom systems, audio control panels, junction boxes, interphone amplifiers, cabin and galley amplifiers systems. The company also designs and manufactures computer-controlled centralized systems: audio management, radio management, failure warning computer, and selective calling systems. The energy conversion department provides a wide range of power supply and converters in the form of equipment units, cards, modules, and miniature hybrids. The sound equipment division provides intercom systems for vehicles and weapon system shelters, field and yard telephones for defense, sound and intercom systems for railway, and data acquisition computers for naval applications. TEAM's capabilities cover the broad areas of engineering (including system logic and design), software design and development, systems management, product assurance (including reliability and maintainability analysis), production (including R&O), quality assurance, documentation, and training. TEAM is a NATO supplier (F6168) and is certified for AQUAP4. Its Canadian subsidiary is DOT approved.

AVERAGE WORK FORCE: PhD - 3
Engs - 15
Others - 235

GROSS SALES: 1988 - \$20.0M
1989 - \$22.0M

PLANT SIZE: 100,000 sq ft

EQUIPMENT Complete digital electronics production facility. In-house computer systems include HP, DEC, and IBM PCs.

EXPERIENCE Present customers include various aircraft manufacturers in both Europe and the US such as Boeing, Douglas, Airbus Industries, Fokker, British Aerospace, etc. Major airline customers include American Airlines, United Airlines, Air France, Lufthansa, Swissair, Northwest Airlines, etc.

REVISED: Mar 90

TELEMUS ELECTRONIC SYSTEMS Inc

ADDRESS: 310 Moodie Drive
Nepean, Ontario
Canada K2K 8G3

CONTACT: Ms Carol Cooke, Marketing Administrator
Tel: (613) 726-1102
Fax: (613) 726-1114

KEYWORDS: Electronic Warfare; ECM; Coherent Countermeasures Systems; Update Digital Memory (Radio Frequency); ECM Techniques Generator; ELINT Products; ELINT Receivers; Digital Pulse Counter (DIFM); Simultaneous Signal Receiver, Frequency Halver, ESM Receiver Test Set; MIC Design & Production; Microwave Prescalers; Radar Signature Analysis; Synthesizers.

HISTORY. Telemus Electronic Systems Inc is a Canadian company which specializes in the research and development of electronic warfare and microwave systems and technology. During its five years of operation, Telemus has received the majority of its revenues from conducting contract research and development. Among its customers are the Canadian, United States, and United Kingdom government, as well as a number of international prime system houses and universities.

Located in a suburb of Ottawa, the Canadian center for defense electronic R&D, Telemus operates out of a 20,000

sq ft secure facility which includes systems integration lab, TEMPEST shielded room with a VAX, MIC facility, and Class 10,000 clean room.

The company also owns a variety of modelling/CAD software which it runs on its integrated local area network.

CAPABILITY. Product areas include.

- ECM
 - Tecmus Naval ECM systems upgrade (ULQ-6C)
 - DSK-504 airborne ECM system upgrade (ALQ-502)
 - 4 and 8 bit digital radio frequency memories
 - Coherent radar target simulator.
- ESM
 - AN/ALM-504 ESM test set (ALR-47)
 - Flightline test set (ALR-67)
- ELINT
 - DSR-100 ELINT receiver family
 - Low phase noise synthesizers
 - 1000 MS/S 8 bit A/D
 - Digital pulse counter

AVERAGE WORK FORCE. Engineers - 15
Others - 20

GROSS SALES: 1988 - \$2.0M
1989 - \$2.0M

PLANT SIZE: 10,000 sq ft

EQUIPMENT: Equipment includes a MIC production lab, TEMPEST shielded room, DEC microvax II computer, photo lithography lab, micro soldering and micro bonding equipment, microwave computer aided design system (MICAD), schematic capture CAD, microwave phase and amplitude network analyzer, microwave scalar network analyzers, sweepers and sources, spectrum analyzers (20 GHz), logic analyzers, microprocessor development system, and oscilloscopes, power meters, and counters.

EXPERIENCE. A Canadian Navy ECM system (ULQ-6C) upgrade using a DRFM went to sea trials in spring 89. Telemus is currently supplying its third generation family of digital RF memories (4 bit x 1.2 Gbps) to clients in the UK, Sweden, and the US. Successful field trials have been completed the DSR-100 ELINT receiver designed to fingerprint radar signals by analyzing unintentional modulation parameters. The Canadian Government has also contracted Telemus to develop two new synthesizer designs and a ultra high-speed A/D and D/A subsystem. Telemus is supplying a 400 MHz-18 GHz prescale for signal activity capture to a US Government agency.

REVISED: Apr 90

TELEX MAGNUM (A Division of TM Communications Ltd)

ADDRESS: #102 - 11400 Bridgeport Road
Richmond, British Columbia
Canada V6X 1T2

CONTACT Mr Terry Ibbetson, President
Tel: (604) 270-1389
Fax: (604) 270-2138

KEYWORDS Ear-Microphone, Handsfree Radio Communications, Headsets, Vehicular Intercom Systems, Communications Design

HISTORY Magnum Distribution was a Canadian-based manufacturing and distribution company founded in 1982. Originally the distributor of the EAR-MIKE producers for North America, the company was so successful they were approached by the manufacturer to enter into a joint venture agreement. This joint venture was completed and Magnum became responsible for the manufacture and distribution of the EAR-MIKE on an international basis. Then in June 1989, Magnum Distribution was purchased by Telex Communications Inc of Minneapolis. The Canadian company, Telex Magnum, now distributes the above products throughout Canada.

CAPABILITY: Telex Magnum is primarily involved in the distribution of EAR-MIKES and headsets, which are the key accessories for two-way portable radio equipment. Telex Magnum has also designed a vehicular intercom system for use in emergency rescue vehicles, fire trucks, or any vehicle which operates in environments where there is a high ambient noise level where maintenance of two-way communication is critical. There is a dealer network established throughout Canada for product support and service. The dealer network in the US is operated by Telex Communications Inc which is located in Minneapolis MN. Additionally, Telex Communications Inc sells EAR-MIKES internationally and can provide product support and service in the following countries: West Germany, Norway, Sweden, Belgium, Denmark, France, the UK, Australia, Singapore, Japan, Hong Kong, Taiwan, Brunei, Indonesia, Malaysia, the Philippines, Thailand, Saudi Arabia, Bahrain, Yemen, Kuwait, United Arab Emirates, Oman, and Qatar.

AVERAGE WORK FORCE: Engineers - 1
Production Mgr - 1
Technicians - 2

GROSS SALES: 1988 - \$280K
1989 - \$400K

PLANT SIZE: 1,800 sq ft

EQUIPMENT: EM-200 Ear-Microphone, EM-200A Ear-Microphone Airline Version, EM-200W Hardwired Intercom System, HS-600 Light Noise Attenuation Headset, HS-700 Medium Noise Attenuation Headset, HS-800 High Noise Attenuation Headset, and Vehicular Intercom System.

EXPERIENCE: Telex Magnum's present government customers include the Department of Supply & Services, the RCMP, the Coast Guard, the Department of Fisheries, and Parks and Recreation. Additionally, other customers include many municipal fire and policing agencies as well as general industry.

REVISED: Mar 90

THOMPSON-HICKLING AVIATION Inc

ADDRESS: 50 O'Connor Street, Suite 402
Ottawa, Ontario
Canada K2P 6L2

CONTACT: John Belcher, President
Tel: (613) 563-3849
Fax: (613) 563-4272

KEYWORDS: Systems Engineering, ATC, Air Navigation, Project Management, Project Support, Economic Analysis, Specification Preparation, Software Services, Transition Planning, Interface Control Document, Training, Logistics Engineering.

HISTORY: Thompson-Hickling Aviation Inc (THA), is a Canadian, high-technology company, based in Ottawa, Ontario, Canada. Incorporated in 1985, THA provides aviation systems engineering, project support, project management, and cost benefit services to domestic and international clients. THA draws liberally on the resources of its parent companies Jerry Thompson & Associates, Inc (JTA), and James F Hickling Management Consultants Ltd (HICKLING).

CAPABILITY: THA is primarily involved in aviation systems engineering in support of air traffic services and air navigation. Expertise exists in a wide range of systems engineering applications, management, and economic analysis as well as, air traffic and air navigation operational activities. Major work has been carried out in a systems engineering and integration project to provide systems design and discipline management of the modernization of the Canadian Air Space System for Martin Marietta Canada and Transport Canada, systems engineering and technical assistance to Transport Canada for the modernization of the National Air Traffic Control System, cost benefit analysis for the Canadian Microwave Landing Systems transition, and many other related projects in the air traffic service and air navigation environments.

AVERAGE WORK FORCE: 25

GROSS SALES: 1988 - \$2.3M
1989 - \$4.2M

PLANT SIZE: 5,000 sq ft

EQUIPMENT: Office PCs with graphics and LAN.

EXPERIENCE: Present customers include various departments in the Canadian Government and industry in both Canada and the United States. These include Transport Canada, Martin Marietta Canada Ltd, Transportation Development Centre, Raytheon Canada, Monenco Ltd, Westinghouse Electronics, AT&T Technologies, National Research Council of Canada, and Bofors Canada.

REVISED: Mar 90

THOMSON-CSF SYSTEMS CANADA Inc (TCSC)

ADDRESS: 18 Auriga Drive
Nepean, Ontario
Canada K2E 7T9

CONTACT: J. Glenn Allen, P.Eng, Vice-President, Business Development
Tel: (613) 723-7000
Fax: (613) 723-5600

KEYWORDS: Computer Simulation; Effectiveness Evaluation; ILS; Life Cycle Costing; Logistics Engineering, Operational Analysis; Program Management; Systems Engineering; Systems Management; Systems Studies, Systems Integration, Training Systems; Minefield Clearing, Enhanced Blast Technology.

HISTORY: Thomson-CSF Systems Canada Inc is a Canadian company incorporated in 1984 with principal office in Ottawa, Ontario. Thomson Systems business is Systems Engineering and Management. Thomson Systems has been established to meet the needs of the Canadian, North American, and world markets for the management and delivery of sophisticated complex systems and their associated logistics support on a turnkey basis.

CAPABILITY: Thomson Systems has the resources, the multidisciplinary capabilities and the sophisticated business practices to respond to complex and functionally diverse requirements in aerospace, communications, command and control, training systems, marine, and transportation for military, government, industrial, and commercial customers. With its systems engineering expertise, its software development capability, its logistics engineering tools, and its proven management know-how, Thomson Systems is able to develop and deliver to its clients, systems which meet all performance, cost, schedule and logistics requirements. As a true Systems Management company, Thomson Systems is not an equipment manufacturer, and as such, it is free to integrate equipment from any subcontractor which best meets the customer's needs.

Thomson Systems is a subsidiary of Thomson-CSF, a member of the French based multinational corporation, Thomson-SA, that operates in over 80 countries.

Thomson Systems is staffed with a Canadian team of the highest caliber. The professional engineering staff are top level systems engineers with a successful track record in the management of major national and international programs. Thomson Systems currently operates out of a 20,000 sq ft facility that has a secure area which is equipped with two TEMPEST facilities for housing equipment assigned to classified projects and a systems integration area of 3,000 sq ft. Sufficient resources, people and infrastructures are in place to handle medium sized projects (\$100 M).

AVERAGE WORK FORCE: Engineers - 40
Others - 10

GROSS SALES: 1988 - \$4.5M
1989 - \$5.0M

PLANT SIZE: 20,000 sq ft

EQUIPMENT: Secure facilities, two TEMPEST Rooms, Apollo DN 550, IBM PC XTs, and 3 micro VAX (1 secure).

EXPERIENCE: Present customers include various departments in the Canadian Government and industries based in Canada, the US and Europe.

REVISED: Mar 90

3-L FILTERS Ltd

ADDRESS: 427 Elgin Street N
PO Box 371
Cambridge, Ontario
Canada N1R 5V5

CONTACT: Mr Les Kadar, Manager, Marketing
Tel: (519) 621-9949
Fax: (519) 621-3371

KEYWORDS: Filter Separators, Micronic Filters; Air Gas Separators; Cartridges; Coalescer; Filters, Fuel Monitors, Fuses; Nozzles; Pressure Vessel Filters; Refueling Hose; Refueling Systems, Separator Cartridges, Separators; Water Purification Systems.

HISTORY: 3-L Filters Ltd is a Canadian filtration system and cartridge manufacturing company founded in 1965 by Mr John Kadar, president of the company. As of 1989, the company was purchased by its former US affiliate in San Jose, California, Velcon Filters Inc, who is now the majority share holder.

CAPABILITY: 3-L Filters Ltd is primarily involved in the design and manufacture of aviation, marine, industrial, petroleum, petrochemical, and nuclear filtration systems and filter cartridges. The aviation division products are micronic filters, fuel water separators, fuel monitors, fuses, nozzles, and refueling hoses for airports (fixed or mobile).

All Canadian airports, and some US and worldwide airports, refuel aircraft with 3-L equipment. The function of the 3-L system is to filter out the solids from jet fuel and to separate water from fuel guaranteeing clean, dry fuel for the aircraft. 3-L provides domestic and worldwide service, product assurance, including reliability and maintainability, analysis, documentation, testing, and free training.

AVERAGE WORK FORCE: PhD - 1
Engineers - 6
Others - 72

GROSS SALES: 1988 - \$5.5M
1989 - \$6.0M

PLANT SIZE: 55,300 sq ft

EQUIPMENT: Equipment includes in-house testing lab and complete R&D facility with pressure vessel fabrication, metal forming, and welding and testing equipment. Other equipment includes cartridge manufacturing, pleating, winding, and knitting equipment, curing ovens and metal stamping, and a fully equipped machine shop.

EXPERIENCE: Customers include oil companies such as Esso, Exxon, Shell, Gulf, Texaco, Petrocan, Mobil, Chevron, BP, Phillips, Conoco, Sunoco, Petrosar, and others; DOD, CP Air, Air Canada, Boeing, Delta Air, Westinghouse, General Electric, Pratt & Whitney, De Laval Turbines, and many other industries including the USAF.

REVISED: Mar 90

TIMMINCO Ltd

ADDRESS: 77 Samor Road
Toronto, Ontario
Canada M6A 1J2

CONTACT: Mr Jack Kade, Vice President Sales and Marketing
Tel: (416) 256-3850
Fax: (416) 256-3855

KEYWORDS: Metals; Ferrous Metals; Non-Ferrous Metals; Adhesives; Casting Alloys; Magnesium.

HISTORY: Timminco Ltd is a Canadian organization resulting from a series of mergers and acquisitions since the formation of Chromium Mining and Smelting Corporation Ltd in 1934.

CAPABILITY: Timminco Ltd operates two businesses, specialized metals and industrial adhesives, through two separate divisions.

- **METALS DIVISION** - Timminco Metals is a world class producer of ferrous and non-ferrous metals including ferrosilicon, magnesium, calcium, strontium, and their alloys. They serve the aluminum, automotive, aerospace, atomic energy, and steel industries. With plants in Canada, the division supplies North America, Europe, and the Pacific Rim. Timminco's product line in the division includes pure metals, sacrificial anodes, desulphurizing products, calcium alloys, strontium alloys, and extrusions.

- **ADHESIVES DIVISION** - Timminco Adhesives which includes Industrial Adhesives in Canada and Universal Adhesives in the US is a leading producer of adhesives and coatings for use by industries in North America. From its 11 plants in Canada and the US, the division produces over 700 specially formulated adhesives, serving over 2,000 industrial customers in a wide range of businesses. Timminco's product line in this division includes emulsions, natural and synthetic latexes, polyvinyl alcohols, dextrins and starches, polychloroprene contact cements, natural and synthetic rubber cements, lacquers, one- and two-component polyurethane adhesives, hot melts, epoxies, urethane adhesives, and modified rubber-based cold seals.

While Timminco's two businesses differ in the products they make and the markets they serve, they are alike in their emphasis on the highest standards of technology, engineering, chemistry, quality control, product development, production efficiency, and timely responsiveness to the specific and exacting requirements of industrial customers. Customer satisfaction is ensured by a broadening application of statistical process control and an expanding quality assurance program.

AVERAGE WORK FORCE: Total - 800

GROSS SALES: 1988 - \$99M
1989 - \$93M

PLANT SIZE: No data.

EQUIPMENT: Facilities are available for extensive chemical and mechanical testing or other methods as appropriate to the product lines.

EXPERIENCE: Suppliers to automotive, nuclear power and chemical industries for more than 25 years.

REVISED: Mar 90

TRACKER INDUSTRIES Ltd

ADDRESS: 6A Tilbury Court, Unit #5
Brampton, Ontario
Canada L6T 3T4

(Mailing Address)
PO Box 1094, Station A
Toronto, Ontario
Canada M5W 1G6

CONTACT: Mr Lou Fedyna, President
Tel: (416) 454-0891
Fax: (416) 454-3939

KEYWORDS: Aviation Software; Build-To-Print, Consulting; Control Systems; Data Acquisition; Computers; Laser Communications,

Microcomputers; Software Development; Software Services; Systems Integration.

HISTORY: Tracker Industries was established in 1974, to provide products and services associated with the use of electronic and computer systems. To date Tracker has concentrated on supplying technical services, designed products, and engineering to the automotive and aerospace industries. Tracker Industries Ltd is a privately owned, Canadian company.

CAPABILITY: Tracker provides custom design/integration/manufacture of electronic and computer circuits and systems that are used in real-time control and data acquisition environments, and SCADA applications.

Real-time control programming using assembly and high-level languages has been implemented for industrial automation applications.

- Software Experience: Operating systems – UNIX, MS-DOS, OS-2; Languages – BASIC, APL, "C", FORTRAN, ADA, Motorola and Intel assembly; and Other – Manufacturing Automation Protocol (MAP).

- Hardware Experience. Mini/microcomputers – DEC, IBM, HP, Olivetti; Programmable Logic Controllers – GEC and Allen-Bradley; Magnetic and optical bar code readers, printers, and systems; Computer controlled security systems; Ruggedized portable computers, and Laser & fiber-optic communications devices.

- Present Activity. Industrial automation and SCADA systems.

AVERAGE WORK FORCE. Engineers/Programmers – 8
Others – 6

GROSS SALES: 1988 – \$1.2M
1989 – \$1.5M

PLANT SIZE: 3,000 sq ft

EXPERIENCE. Tracker Industries' clients include General Motors, McDonnell Douglas, Bell Helicopter, Boeing, and Federal & Provincial government departments.

REVISED: Mar 90

TRECO MACHINE & TOOL Ltd

ADDRESS: 123 Crockford Boulevard
Scarborough, Ontario
Canada M1R 3C1

CONTACT. Mr Barry Lodge, Engineering and Sales
Tel: (416) 751-5861
Fax: (416) 751-8713

KEYWORDS. Machining, Precision Machining, CNC Machining, Aircraft Engine Components; Landing Gear Components; Guidance System Components; Nuclear Reactor Components; Printer Components/Assemblies.

HISTORY. Treco Machine & tool is a Canadian-owned company founded in 1957.

CAPABILITY. Treco Machine & Tool specializes in manufacturing small, high-precision components. Our comprehensive capabilities include CNC machining, production milling, drilling, tapping, turning, boring, and grinding. Production is supported by our process engineers assisted with a CAD/CAM system. Treco is a military-approved supplier with an established quality control program approved to the following standards: MIL-I-45208, DND 1016, AQAP 4, CSA Z 299-3.

AVERAGE WORK FORCE. Engineering – 16
Administration – 9
Others – 90

GROSS SALES: 1988 – \$7.0M
1989 – \$7.5M

PLANT SIZE: 40,000 sq ft

EQUIPMENT. Major equipment includes 3 & 4 axis CNC machine centers, 2 & 3 axis CNC turning centers, coordinate measuring machines and CAD/CAM stations.

EXPERIENCE: Major customers include Pratt & Whitney Aircraft, Litton Guidance Systems, Atomic Energy of Canada, and IBM.

REVISED: Mar 90

TUL SAFETY EQUIPMENT Ltd

ADDRESS: 1432 Aberdeen Street
Hawkesbury, Ontario
Canada K6A 1K7

CONTACT: Mr J C (Chuck) Derby, President
Tel: (613) 632-1411
Fax: (613) 632-7270

KEYWORDS Life Support Equipment, R&O (Rafts), R&O (Lifejackets), Rafts; Lifejackets; Webbing Straps; Safety Harnesses.

HISTORY The company, now known as Tul Safety Equipment Ltd, was previously RFD Canada which was established in Granby, Quebec, in 1951 by its parent company RFD, situated in the United Kingdom. In 1963, RFD Canada was sold and renamed Tul Safety Equipment Ltd. Tul Safety Equipment Ltd remained in Granby until January 1969 when it moved to its present location in Hawkesbury, Ontario. There have been three expansions since then with the latest completed in late fall 1988.

CAPABILITY: Tul Safety Equipment Ltd is a Ministry of Transport approved inflatable liferaft and lifejacket manufacturing, repair, and overhaul facility, as well as being approved to DND 1015/NATO AQAP-1, FAA, and Canadian Coast Guard specifications

Tul Safety Equipment Ltd is a supplier of safety equipment to the Canadian Armed Forces, Ministry of Transport, all Canadian air carriers, shipping fleets, as well as fishing fleets. Tul Safety Equipment Ltd is also the major supplier of all webbing straps and associated hardware to General Motors of Canada for the Light Assault Vehicle (LAV) as supplied to the American Armed Forces. Tul Safety Equipment Ltd is qualified to service, repair, and overhaul helicopter floats and to manufacture aircraft and automobile safety harnesses.

Some of the international companies represented in Canada by Tul Safety Equipment Ltd are Polyplastex United (aircraft interiors), Permacel Tapes, Malabar Hydraulics, and Columbus Jack Corporation

Tul Safety Equipment Ltd maintains an approved network for repair and overhaul facilities from Newfoundland to British Columbia to ensure its customers do not suffer any unwarranted delays in satisfying their requirements.

In conjunction with its above-mentioned capabilities, Tul Safety Equipment Ltd has initiated and maintains a strong research and development profile with ongoing research and development for NASA, Canadian Armed Forces, and industry.

AVERAGE WORK FORCE. Management – 20
Others – 70

GROSS SALES: 1988 – \$4.5M
1989 – \$5.5M

PLANT SIZE: 50,000 sq ft

EQUIPMENT. Tul Safety Equipment Ltd's specialized equipment includes four heat sealing machines.

EXPERIENCE. The company's present customers include various departments in the Canadian Government and industry, both in Canada and the US. The company has also exported to Norway, Japan, Australia, and other countries. Major customers include Department of National Defence, Air Canada, Canadian Airlines, and General Motors.

REVISED: Mar 90

UDT INDUSTRIES Inc

ADDRESS: 2125 East, St-Catherine East
Montreal, Quebec
Canada H2K 2H9

CONTACT Mr Alberto Stagnaro, Contract Administration
Tel: (514) 526-9454
Fax: (514) 526-0902

KEYWORDS CNC Machining, Heat Treating, Machining, Precision Machining.

HISTORY: UDT was incorporated in 1942 under the name of Universal Die & Tool. Name was changed to UDT Industries Inc in 1975 to reflect more accurately their machine shop business. The company is Canadian owned and there are no other Canadian or US subsidiaries.

CAPABILITY: UDT's major products are machined parts ranging from light-medium to hard core items, such as fittings, splice plates, hinges, bulkheads, slat-tracks, spars, dog legs, spar caps, leg assemblies, etc., made from plate stock, forgings, extrusions, aluminum alloys, steels, titanium, etc. CNC and conventional equipment are utilized.

An aluminum alloys heat treating electrical air furnace is part of UDT's capability, 5 ft diameter by 18 ft high. It is continuously performing quench & age hardening of major structural parts for McDonnell Douglas & Lockheed Aircraft from AL AL 7075 T 411 & 2014 T 411 condition F to T6 or T73 condition. UDT works to MIL-I-45208 and DND AQAP-4 & 6. Tolerances are maintained as per customer's requirements.

AVERAGE WORK FORCE: Engineers - 1
Inspectors - 5
Machinists - 60
Programmers - 4
Others - 24

GROSS SALES: 1988 - \$11.8M
1989 - \$12.2M

PLANT SIZE: 110,000 sq ft

EQUIPMENT: NC equipment includes vertical machining centers; horizontal machining centers, vertical profiling milling machines, vertical profilers (bed type 3 & 4 axis); a 5 axis machining center; a 3 spindle, 5 axis, 2 gantry profiler with a 90 ft bed; and 1 rail-type profiler (3 spindle, 5 axis).

EXPERIENCE UDT's customers include McDonnell Douglas Canada Ltd (MD 90 & MD 11), Canadair (from T33 to Airbus and Challenger), Enheat, deHavilland Aircraft, Fleet Industries (Lockheed Product), NATO, USAF, CCC, DND, Rohr, Research & Development Canada (Propulsion Pod), ITT Gilfillan (Antenna Radar), McDonnell Douglas Corporation - St Louis (F 18), Grumman Aerospace, and Bristol Aerospace.

REVISED: Mar 90

ULTIMATEAST DATA COMMUNICATIONS Ltd

ADDRESS: 60 Water Street
PO Box 5933
St John's, Newfoundland
Canada A1C 5X4

CONTACT. Mr Roderick J White, Vice President
Tel: (709) 576-4747
Fax: (709) 576-2125

KEYWORDS. Digital Signal Processing, Communications Network Controllers; Communications Software; Geographic Information Systems; Marine Communications; Remote Communications Terminals; Packet Assemblers and Disassemblers; Interface Devices.

HISTORY: Ultimateast was formed in 1985 to specifically develop technology for marine, remote, and mobile communications. It is a 100% Canadian company based in St John's, Newfoundland. Ultimateast is affiliated with Canada's privately owned high seas coastal station, Sea Link Ltd.

CAPABILITY: Ultimateast specializes in marine, remote, and mobile communication networks. It has developed a fully integrated data communications network called MNet using high frequency and radio based on its intelligent modem called DataHail. Developed for the network are a network controller and a communicating GIS called FLAG (Fleet Locating and Graphics). At present Ultimateast is converting their products for use on MSAT (Mobile Satellite) for use throughout North America.

AVERAGE WORK FORCE: Computer Scientists - 2
Engs - 4
Physicists - 1
Technologists - 5
Technicians - 3
Other - 10

GROSS SALES: 1988 - \$1.0M
1989 - \$2.0M

PLANT SIZE: 5,000 sq ft

EQUIPMENT: No data.

EXPERIENCE. Present customers include various departments in the Canadian Government and industries in both Canada and the US. The following is a partial list. Canadian Broadcasting Corporation, Canadian Coast Guard, Canadian Helicopters Corporation, Department of Fisheries and Oceans; Husky Oil; Newfoundland and Labrador Hydro; Petro Canada, Sedpex Inc, Signatron Inc, and Telesat Mobile Inc.

REVISED: Mar 90

ULTRA LASERTECH Inc

ADDRESS: 6423 Northan Drive
Mississauga, Ontario
Canada L4V 1J2

CONTACT. Mr T F E Loster, VP, Marketing & Sales
Tel: (416) 677-8091
Fax: (416) 677-8095

KEYWORDS: CO₂ Lasers; CO₂ Optoacoustic Detector; Continuous Wave CO₂, Excimer Laser, Frequency Stabilizers, Isotopic CO₂, Laser Controllers, Lasers, Mirror Mounts, Optoacoustic Trace Gas Analyzer, Photoacoustics, Pollution Detection, Power Supplies, Sealed CO₂, Spectroscopy, Stark Cell, Tuneable CO₂, Waveguide Lasers.

HISTORY. Ultra Lasertech Inc (ULI) is a high-technology company incorporated in 1979 with a laser technology base and licensing derived from RCA. There are no other Canadian divisions and no US subsidiaries.

CAPABILITY: Ultra Lasertech is engaged in the design and manufacture of custom CO₂ lasers and wave guide lasers. They are involved in R&D associated with laser photoacoustics, laser spectroscopy, and laser communications and radar. Other areas of expertise include remote sensing, pollution detection, ultra high power laser modeling and design, and laser applications. Their product line includes sealed, continuous wave, isotopic CO₂ lasers; tuneable CO₂ lasers; a CO₂ laser optoacoustic detector; industrial-type sealed CO₂ lasers; laser stabilizers; laser power supplies; mirror mounts; stark cell frequency controller; frequency stabilizer and NH₃ laser.

AVERAGE WORK FORCE: Total - 12

GROSS SALES: 1988 - \$800K
1989 - \$750K

PLANT SIZE: 10,000 sq ft

EQUIPMENT: A laser-based optoacoustic facility for measuring absorption co-efficients of gases and vapors in the 9 - 12µm region. Measurements can be made at reliable pressure and temperature. A facility for fabricating hard seals required for CO₂ laser structures of glass and ceramic materials. These seals can be made between various thermally mismatched materials.

EXPERIENCE: From its principals, the company has a background of some 14 years' experience in sealed CO₂ laser technology and ultra-high power, fast-flow CO₂ laser development. Since its founding in 1979, Ultra Lasertechn has continued developments in long life, sealed CO₂ laser systems, tunable and non-tunable, to power ranges from 5-90 watts CW and with various CO₂ isotopes. These projects include the development of the 13CO₂, 14CO₂ and 18CO₂ laser systems covering the 8.9 to 12.1 µm range, a folded 75 watt system, a feedback stabilization system based on the optogalvanic effect for controlling the laser to a line center or off-set, a stark cell frequency controller for shifting waveguide lasers by +500 MHz, and a variety of customized laser systems for special research applications. Presently under development is a compact CW or pulsed air cooled, sealed CO₂ laser and a compact excimer laser for medical applications. Also ULI has, since 1979, a continuing program in laser-based optoacoustic research and development. These projects include the development of CO₂ laser optoacoustic trace gas analyzer for detecting ambient nitric acid vapors to the 1 ppb level, a balanced dual spectro-phone chamber, a stark modulated optoacoustic detector that can detect ammonia at concentrations of 0.2 ppb in air, the measurement of the optoacoustic signatures of 30 hazardous gases of environmental and industrial concern (it is anticipated that this technique is suitable for the detection of hydrazine at low ppb levels), the investigation concerning detection of PCBs and explosive vapors, and precise measurements of water vapor at various partial pressures and temperatures in the 9-to-12 µm region.

ULI has delivered laser system to companies around the world. Among these are NASA, JPL, Vought Aerospace, NOAA, McDonnell Douglas, Naval Research Labs, Brookhaven, Max Planck Institute, and Horiba & Sumitomo. ULI has also performed contract research for the Department of National Defence, National Research Council, and Atmospheric Environment Service.

REVISED: Mar 90

UNISYS CANADA Inc (Defence Systems)

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Winnipeg, Manitoba
Canada R3J 3W3

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Management
Tel: (204) 831-3346
Fax: (204) 831-3312

KEYWORDS: Computers; Computer Parts; Information Handling Products; Measurement & Control Systems; Distributed Processing; Local Area Networking; Vibration/Acoustic Intensity Measure; Multi-Layered Board Assemblies; Pre-Wired Board Assemblies; PC Board Design & Fabrication; PC Emulators, Power Supplies, Video Display Systems, Core Wound Products, Core Memory Arrays, Magnetic Tape Transports, Maintenance Consoles; Harnesses, Switches, Software Services, Ada Software.

HISTORY: Unisys Canada Inc Defence Systems was established in Canada in 1977. It is a diverse, Canadian company providing systems and products to the Canadian government and major defense contractors in Canada and abroad. It specializes in the manufacture of militarized and ruggedized electronic hardware and is certified to AQAP-1

standards. Since its beginning, Unisys has grown in annual sales to more than \$65 million in 1989.

CAPABILITY: Unisys Canada Inc Defence Systems has developed capabilities in three facilities across Canada, each supported by an experienced technical and administrative staff and certified to AQAP-1 standards.

The manufacturing plant in Winnipeg serves as the company's head office. This facility offers customers a full range of engineering and manufacturing capabilities with precision equipment capable of handling all aspects of MIL-SPEC assembly including quality assurance, environmental stress screening, test engineering, production engineering, production/material/procurement control, configuration/data management, specific assembly capabilities, sub-assembly test, and final test.

The Winnipeg facility is certified for document storage up to secret level and is qualified to the following Canadian, NATO, and US DOD requirements. AQAP-1, AQAP-4, AQAP-6, AQAP-13, MIL-Q-9858A, MIL-I-45208A, and MIL STD-45662. With its advanced production facilities, the Winnipeg plant can put designs and concepts quickly into production. Expertise has been developed in areas such as the manufacture of cabinet assemblies, coil wound devices, cable and harnesses, printed circuit assemblies, core memory stringing, wire wrapping, PROM programming, mechanical assembly, and high density and high reliability MIL-SPEC power supplies.

Unisys maintains a medium-sized facility in Ottawa, Ontario, near the Department of National Defence headquarters, ensuring close liaison with our prime customer. This facility is staffed with a group of systems and application engineers experienced in developing advanced systems for command, control, surveillance, fire and control, and training programs for DND and other major defence contractors. An extensive base of experience supports this group's ability to evaluate and undertake analysis of complex systems projects to ensure cost-effective solutions. This group has developed a unique capability to design systems using the Ada software language to DOD-STD-2167 and 2167/A. Systems developed by Unisys in Ada have already been deployed operationally with the Canadian Forces.

In Halifax, Unisys has a small organization that provides direct on-site support to the East Coast forces of DND. This is an experienced group of senior application engineers actively involved in the life cycle support of the CP-140 Aurora Aircraft and the Halifax Fleet Operations. This group also provides the required support for systems that are or will be deployed operationally with DND, such as the Shipboard Integrated Processing and Display system (SHINPADS), Message Handling System (MHS), and Message Processing System (MPS).

Unisys also has a major facility in Montreal with a complete range of capabilities in operational analysis, systems modeling and simulation, software design, coding, debug, test, integration and documentation, software quality assurance, and management of real-time software development projects. Since 1984, this group has been dedicated to the Canadian Patrol Frigate Project.

AVERAGE WORK FORCE: Technical - 72
Assembly - 159
Other - 119

GROSS SALES: 1988 - \$60M
1989 - \$65M

PLANT SIZE: Winnipeg - 79,430 sq ft
Ottawa - 8,299 sq ft
Halifax - 150 sq ft

EQUIPMENT: Unisys Canada Inc Defence Systems has a wide range of advanced equipment including Apollo/Mentor CAD system, logic analyzers, processor emulators, oscilloscopes, multimeters, ROM simulators, Digital VAX 11/750, spectrum analyzers, environmental test chamber, automated card and final test systems, flow solder machines, component lead formers, semi-auto dip inserters, and static-controlled work stations.

EXPERIENCE: Unisys Canada Inc Defence Systems has developed considerable experience through involvement in a wide range of engineering and manufacturing projects for customers within the company,

with outside contractors, and with the governments of Canada and the US.

Among the engineering efforts undertaken by CSD Canada include the AN/UYK-502 Engineering Pre-Production Program and the AN/UYK-501 Engineering Pre-Production Program, the development of an engineering development model (EDM) of the SHINPADS serial data bus, and then carrying the EDM into production for the CPF and MATCALS; and the improved Memory Development Program in which CSD Canada provided the full scale engineering development model to provide a form fit function replacement for the AN/AYK-10 mated film memory.

In addition to these major efforts, CSD Canada has been involved in a number of research projects of a smaller scale.

Unisys Canada Inc, Defence Systems, has also been involved in the contract definition phase for the new ship-borne aircraft program designing the mission planning and analysis system and the shipboard tactical support system. In sales to the United States, Unisys has been providing the US Navy with a form fit function replacement for the AN/AYK-10 mated film memory on board the S-3 ASW aircraft. This contract is now in its fourth year. Finally, Unisys is also building computer hardware for the USAF Airborne Battlefield Command and Control Center program.

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URSEL SYSTEMS Ltd

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Fax: (613) 224-8123

KEYWORDS: Systems Design; Systems Integration; Flight Management Systems; Airborne Mission Management Systems; Navigation; Sensor Data Processing; Flight System Displays; ATC Systems; ATC Simulators; Radar Processing; Flight Service Stations; Reconnaissance Aircraft Systems; Navigation Training Systems; Systems Analysis.

HISTORY Ursel Systems Ltd is a privately-held, Canadian-owned company in the system design, development, and integration area. The company specializes in aerospace applications. It was founded in September 1981.

CAPABILITY Company experience includes the development of systems for radar processing, navigation management, and command and control. All systems have included the use of user friendly control display techniques. A substantial human factors capability related to real-time systems design has been developed.

The foregoing activities have resulted in the company building experience in multi-sensor and mission management systems. The company has also undertaken critical work in air traffic control including a comprehensive simulation system, a command and control system, and a data acquisition system.

Substantial in-house development facilities are available. Quality assurance, configuration management, and reliability and maintainability programs are in place.

Corporate strategy is to apply the company's unique skills and resources to the study, design, and implementation of advanced technology systems in any field of endeavour.

The company has been financially successful since incorporation. Average revenues during the past three years exceed \$4.0 million. Profit levels are in excess of 15%.

AVERAGE WORK FORCE: PhD - 2
Engs & Comp Spec - 20
Others - 5

GROSS SALES: 1988 - \$3.9M
1989 - \$5.1M

PLANT SIZE: 6,000 sq ft

EQUIPMENT. Twenty IBM PC, AT, XT personal computers, concurrent computer systems processor, 12 terminals, LAN - Ethernet, avionics test equipment; software simulators.

EXPERIENCE. Present customers include Boeing Canada (deHavilland Division), Federal Department of the Environment, Federal Department of Transport, Ontario Ministry of Transportation, Department of Regional Industrial Expansion, and National Research Council.

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VAC-AERO INTERNATIONAL Inc

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Canada L6L 2X5

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Fax: (416) 827-7489

KEYWORDS: Brazed Aluminum Heat Sinks; Electron Beam Welding; Machining; Plasma Spray Coating; R&O (Engine Components); Vacuum Brazing; Vacuum Furnaces; Vacuum Heat Treating; Heat Treating; Metal Coatings, Brazing, Build-To-Print, Coatings (Plasma Spray), Coatings (CODEP); Diffusion Coatings (CODEP).

HISTORY: VAC-AERO is a Canadian-owned, high-technology company offering heat treating, brazing, electron beam welding, and repair and coating services to the aerospace, airline, avionics, electronics and other key industries throughout the US and Canada. In addition, VAC-AERO designs, manufactures and sells specialized heat treating and vacuum furnaces to these industries.

VAC-AERO was originally founded in 1959 in Oakville, Ontario, a Montreal Division was established in 1967 to meet the growing demand for its services from Quebec area customers.

CAPABILITIES. VAC-AERO holds processing approvals from all major aerospace manufacturers for the following services.

Thermal processing of OEM components:

- Vacuum heat treatment of high-strength steels for landing gear components and structural airframe parts.
- Vacuum heat treatment for turbine parts, shafts, turbine blades, casings, and nuclear components.
- Vacuum Brazing for turbine nozzles, compressor stators, afterburner casings, combustion cowls, wave guides, aluminum cold wall assemblies and heat exchangers, and nuclear parts.
- Electron beam welding for turbine assemblies and electronic components.
- Plasma spray coating for combustion liners, fan and stator casings, and miscellaneous parts.

Repair and overhaul of jet engine components.

- VAC-AERO is approved by Transport Canada and various aerospace companies for a variety of repairs using plasma spray, vacuum brazing, tungsten arc and electron beam welding.
- Specific components repaired include compressor stators, turbine vanes and nozzles, combustion chambers, shafts, and miscellaneous components.

Manufacture of new parts to print:

- VAC-AERO can also manufacture brazed and electron beam welded assemblies to customer specifications and drawings. VAC AERO specializes in components such as aluminum vacuum brazed heat sinks and cold wall assemblies for radar and avionics equipment. VAC AERO offers a complete line of cold wall vacuum furnaces ranging from small laboratory models to large bottom loading production units. VAC AERO has supplied these furnaces to a wide variety of customers in the aerospace, nuclear, and other high technology industries.

- In addition, VAC AERO can supply ancillary furnace equipment such as high-temperature molybdenum fixtures, water recirculating units, and work handling systems. VAC AERO also offers complete turnkey installation services, extensive operator training programs, and post-sale preventive maintenance service.

AVERAGE WORK FORCE: Engineers - 18
Others - 110

GROSS SALES: 1988 - \$8.6M
1989 - \$9.9M

PLANT SIZE: 10,780 sq ft (Oakville Division)
9,250 sq ft (Montreal Division)

EQUIPMENT: VAC-AERO employs the following equipment.

- Vacuum oil quenching furnaces capable of hardening part sizes to 72 in. diam. x 84 in. high, vacuum brazing and heat treating furnaces suitable for temperatures to 2700°F and ultra high vacuum levels to 1x10⁻⁶ torr.
- CNC machining centers, a fin forming machine, and a computer controlled co-ordinate measuring machine, combined with an electron beam welder (chamber size 36"L x 36"H x 52"W, extendible to accommodate shafts to 72"L) provide full in-house capabilities for the manufacture of parts to print.
- Plasma coating equipment including Metco 3M, 45kW and Metco 7M, 80kW plasma guns, and a METCO AR-1000 Robot.
- In-house facilities for repair and overhaul including lathes, vertical mills, grinders, and EDM equipment for machining.
- Complete metallurgical laboratory in addition to normal dimensional checking equipment, complements quality control capabilities.

EXPERIENCE. Present customers include numerous companies in the aircraft, avionics, electronics and nuclear power generation industries. VAC-AERO holds current processing approvals from the following companies. Canadian Forces, Boeing Aircraft Co, Canadair, The deHavilland Aircraft of Canada Ltd, McDonnell Douglas Aircraft Co, General Dynamics, Grumman Aircraft, Pratt & Whitney Aircraft, Hartford, CT, Pratt & Whitney Canada, General Electric, Burlington, VT and Lynn, MA, Garrett Airsearch Mfg, Litton Systems (Canada), Litton Systems (USA), Hawker Siddeley Canada, Orenda Division, Menasco Canada Ltee, Menasco, Burbank, CA, Spar Aerospace, Bristol Aerospace Ltd, McDonnell Douglas, Cleveland Pneumatic, Bell Aerospace, Fort Worth, TX; Sikorsky Aircraft, Stratford, CT; DAF Indal Ltd; Fleet Industries; Kaman Aerospace, Bloomfield, CT, and Avco Lycoming, Stratford, CT.

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VADEKO INTERNATIONAL Inc

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KEYWORDS. Robotics (Large Scale), Robotic Aircraft Painting, Rocket Motor Robotics, Space Systems, Thin Film Deposition, Automation, Optical Monitors, Optical Inspection, Compact Disc Manufacturing, Reverse Vending Machine, Recycling Equipment, Systems Engineering, Off-Line Programming, Underwater Vehicles, Nuclear Repair Equipment, Engineering Consultants, Aircraft Painting, Consulting (Engineering).

HISTORY. Established in 1981 by key players from the Canadarm program, this wholly-Canadian-owned, systems engineering company has grown to encompass a broad spectrum of advanced technologies, including large-scale robotics, electro-optics, math modeling, simulation, and thin film deposition. Agra Industries of Saskatoon acquired 50% of Vadeko shares in 1987.

CAPABILITY: Vadeko is recognized as an aerospace industry leader in the development and manufacture of large-scale robotic systems. Vadeko's systems utilize off-line programming and math modeling.

Staff capabilities and experience permit Vadeko to lead a project through the initial stages of requirements definition, system conception, and design to development, manufacture, assembly, integration, and test.

AVERAGE WORK FORCE. 120 (Professional Staff)

GROSS SALES: 1988 - \$20.0M
1989 - \$20.0M

PLANT SIZE: 45,000 sq ft (office and plant)

EQUIPMENT. CAD systems, electrical/electronics laboratory, mechanical laboratory, machine shop, assembly/integration/test area with 20 ft clear ceilings.

EXPERIENCE. Vadeko's experience includes.

- Solid Rocket Motor Manufacturing - Major rocket motor manufacturers and the US Navy use Vadeko Robotic Systems for coating application, propellant inspection, and repair of solid rocket motors. The Vadeko Bore Inspection Tool Systems (BITS) assists Morton Thiokol in maintaining the performance and reliability of shuttle rocket boosters (SRB). Hercules Aerospace uses the Vadeko automated robotic painting systems (ARPS) to apply specialized coatings to the inside and outside of Titan and Delta rocket boosters. A smaller system, the automated case bondliner (ARPS), performs coating application to a variety of strategic rocket motors for the US Navy.

- Robotic Aircraft Painting - Vadeko's fully automatic, robot painting systems solve the major problems of aircraft painting, expensive downtime, consistency and uniformity of coating application, and the hazard to human workers from increasingly toxic paint formulations. An extensive background in spray coating technology ensures that Vadeko systems are ideally suited to a variety of coatings, including "stealth" and other low-observability materials. Vadeko is currently involved in the design, building, and installation of a fully automated robotic painting system for McDonnell Douglas to paint the C-17 and other large aircraft. Talks are underway with Northwest Airlines and Boeing for similar systems.

- Related Technologies - Vadeko has extensive experience in large-scale robotics systems for a variety of applications, including the CN rail car painting system, the robotic under car cleaning system, the Ontario Hydro nuclear repair system, and the Tridon automated assembly system. As a leader in thin film deposition technology, Vadeko is currently involved in a variety of related applications, including document security devices, superconductivity, optical inspection and monitoring, and special coating application. Thin film and robotics technologies have come together synergistically in the production of automated manufacturing systems for compact disks and CD ROMs.

Vadeco's customers include McDonnell Douglas, Morton Thiokol, Hercules Aerospace, US Navy, US Air Force, IBM, Canadian Forces, National Bank of Canada, Government of Canada, Ontario Hydro Nuclear, and CN Rail.

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VARIAN CANADA Inc

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Georgetown, Ontario
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Fax: (416) 877-5327

KEYWORDS: Amplifier Subsystems, Amplifiers, Control Circuitry, Extended Interaction Klystrons, Klystrons, Millimeter Wave Subsystems, Power Amplifiers, Power Klystrons, Power Supplies, Pulsers, Reflex Klystrons, Satellite Communications Power Amp, Solid State Devices, Travelling Wave Tubes, Waveguides, X Ray Power Supplies, Transmitters, microwave; Millimeter Wave, High Voltage

HISTORY Varian Canada Inc is a wholly owned subsidiary of Varian Associates of Palo Alto, California. The Canadian operation, located near Toronto, Ontario, was originally incorporated in 1955 to supply microwave tubes to the Canadian military.

The engineering and manufacturing segment of the company, Varian Canada Microwave Division (VCMD), operates under the umbrella of the Electron Device Group of the parent company, Varian Associates Inc, Palo Alto, California. This group forms the largest electron tube manufacturing operation in the free world. Since its inception, the Canada Microwave Division has grown steadily and expanded its original charter to include many unique and customized products for world-wide markets (75% of sales are exported). Currently, the product line is split evenly between electron tubes and electronic equipment.

CAPABILITY: The following is a brief description of the major products manufactured at Varian Canada Microwave Division. Since many of the products were designed by the division, full facilities and capabilities exist in-house for customizing to the needs of individual customers. Both MIL and commercial specifications can be met

- **Travelling Waves Tubes** These tubes are produced for microwave line of sight (LOS) communication applications and cover frequencies ranging from 3.5 GHz to 15 GHz at power levels up to 50 watts. The product line includes a complete selection of conventional technology TWTs as well as metal ceramic high efficiency and high linearity tubes. The company has the capability to customize existing designs to meet customer's unique requirements and to develop retrofit packages to upgrade older field installations.

- **Power Klystrons** This product line consists of a series of power klystrons used primarily as high-power amplifiers in satellite earth stations and troposcatter communication applications. These are available at frequencies of 5, 6, and 14 GHz with power levels up to 3 kilowatts. Various channel tuner configurations are available, including a microprocessor-controlled, automatic-channel tuner.

- **Reflex Klystrons** VCMD has an extensive line of reflex klystrons typically used in communications and radar systems for airborne and ground based applications, plasma diagnostics, spectroscopy, meteorological instrumentation, and other experimental and scientific applications. The line ranges from the lower frequency tubes (8 to 25 GHz) with power outputs from 10 to 450 mW up to millimeter reflex klystrons ranging from 30 to 220 GHz with output powers from 5 to 800 mW.

- **Extended Interaction Klystrons (EIK):** This product line originated at the VCMD facility. The products address millimeter wave applications, ranging from 30 GHz to 280 GHz. EIKs are

rugged, lightweight, and compact and are capable of generating medium rf power levels in either continuous or pulsed modes. The cw power levels of these klystrons range from 1 kW at 18 GHz to 1 watt at 280 GHz. Peak power outputs range from several kilowatts at 30 GHz to 60 watts at 220 GHz. These EIKs are well suited as rf power sources for a wide range of applications such as fire control radar, terrain following radar, illuminators, weather radar, plasma heating, radio astronomy, surveillance radar, satellite communications, tracking radar, radar modelling, and fusion diagnostics.

- **Millimeter Wave Subsystems.** VCMD offers a range of millimeter wave transmitter subsystems which consist of a modulator, a power supply, and control circuitry driving the Varian line of extended interaction klystrons. These transmitter systems operate in discrete frequency bands ranging from 30 to 220 GHz for pulsed and CW applications and can be designed to meet customer requirements to commercial or MIL specifications.

- **Power Supplies:** The basis of this product line is a complete series of power supplies which complement VCMD's electron tubes. However, in addition, specialized, complex power supplies have been developed and manufactured by the division to both MIL and commercial specifications, requiring capabilities such as high and low voltage outputs, DC or AC inputs, multiple outputs, stringent noise and regulation requirements, and unique shapes and sizes. Power levels up to 80 kW and voltages up to 200 kV have been achieved. Power supplies available include those for x-ray systems, microwave tubes, and semiconductor processing application.

VCMD is able to qualify and test to MIL and commercial specifications. Customized products are a specialty of the division. Organizational and administrative systems are in place to ensure the smooth execution of commercial and military contracts requiring exceptional attention to detail. These include fully computerized and on-line Manufacturing Resources Planning and a complete Quality Assurance system appropriate for MIL requirements.

AVERAGE WORK FORCE: Total - 300

GROSS SALES: 1988 - \$22M
1989 - \$25M

PLANT SIZE: 120,000 sq ft

EQUIPMENT/FACILITIES. VCMD has in-house all of the extensive facilities and capabilities needed for the manufacture of high-quality electron tubes and electronic equipment. A few of the facilities which support such precise and delicate design and manufacturing activities are "Watchmaker accuracy" machine shop, in-house manufacturing of high voltage transformers, test facilities for microwave tubes, subsystems, and power supplies, clean rooms, vacuum sealing facilities, electric discharge machining, environmental test facilities, hydrogen and vacuum furnaces; and laser welding.

EXPERIENCE: VCMD has in excess of thirty-five years of experience working with original equipment manufacturers of microwave and satellite telecommunications equipment. The division has also been involved in various development programs for power supplies and other electronic subsystems to customers' specifications for many years.

Military programs have been a successful part of VCMD's operation. The largest single program lasted three and one-half years and was valued at approximately \$6.0M. In 1979, the company produced a space qualified instrument which was successfully flown on a NASA satellite designed to measure the earth's magnetic field. As well as private industry throughout North America, Europe, and the Far East, the clientele also includes the Canadian, US, and several European Governments, plus various agencies, laboratories, and research institutions associated with these governments.

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VESTSHELL Inc

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Montreal North, Quebec
Canada H1H 3R2

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Fax: (514) 326-6140

KEYWORDS: Castings; Investment Castings; Heat Treating.

HISTORY: Vestshell Inc is a Canadian-owned, ferrous investment casting foundry, specializing in aerospace applications of this technology. Vestshell has been in business in Canada for 30 years and has a sister plant in St Albans, Vermont, controlled by the same ownership.

CAPABILITY: Vestshell Inc has an approved quality assurance system working within the parameters required by AQAP-1, MIL-I-45208, and DND 1015. Complete NDT capability to MIL specs and heat treating to MIL-H-6875 are under their roof. Castings from 1 oz to 200 lbs and in size from .125" to 42" cube are currently possible. Vestshell has developed a process capable of casting large castings with wall thicknesses as low as .040" which have integrity to pass radiographic inspection levels of Grade B generally and locally, Grade A.

AVERAGE WORK FORCE: Manufacturing - 150
Engineering - 10
Quality Assurance - 8
Others - 15

GROSS SALES: 1988 - \$12.0M
1989 - \$12.8M

PLANT SIZE: 65,000 sq ft

EQUIPMENT: No data.

EXPERIENCE: The company's customers include Texas Instruments (DSEG), Martin Marietta (Orlando Division), Allied Signal Aerospace (Kansas City Division), Pratt & Whitney Canada, Northrop Corporation, Raytheon Co (Missile Systems Group), Canadair, and FMC (Land Systems Group).

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VICTRIX Ltd

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KEYWORDS: Ground Station Antennas; Modular Practice Bomb; Plastic Fabrication; Portable Antenna Masts (Surface); Practice Bomb; Pyrotechnics; Smoke Markers; Weapon System Controls; Machining; Target Systems (Infantry & Armored); R&D (Electronics).

HISTORY: Incorporated in 1975 (100% Canadian owned).

CAPABILITY: Approximately 80% of the R&D and manufacturing conducted by Victrix is for the Canadian Department of National Defence. Typical engineering projects include:

- Technical investigations and engineering services to DND on marine weapon systems drives and controls.
- Engineering services to industry on control systems for machinery and large winches.
- Engineering services to industry on sound and vibration problems in gear systems.

- Designed and developed 1.2 m plastic parabolic antenna for 11.6 GHz satellite receiving.
- Developed production techniques for fabrication of outdoor unit to house LNA of satellite receiving antenna.
- Investigated dielectric feed horn problems and developed modifications.
- Engineering services on avionics flight surfaces control systems.
- Design and development of infantry and armored target systems.

Manufacturing capability includes the following items

- Amplifiers, reactors, special transformers, & RF coils.
- Fiberglass microwave dish antennas.
- Small gears and gear reducer assemblies.
- Extrusion and molding of miscellaneous plastic and rubber parts.
- Aircraft smoke signal markers pyrotechnics
- Cable assemblies.
- Marine projectile line throwing devices
- Inflatable mast antennas.
- Marine weapon system drive and controls.
- Modular practice bombs.

Victrix also has an R&O capability for radar duplexers, precision electronic components, and power supplies.

AVERAGE WORK FORCE: Engineering & Technical - 12
Machinists - 5
Production People - 50
Quality Control Manager - 1

GROSS SALES: 1988 - \$5.5M
1989 - \$5.6M

PLANT SIZE 30,000 sq ft (2 locations)

EQUIPMENT: Machining (CNC), vacuum molding, fiberglass lay up and forming, electronic laboratory to 20 GHz measurement, and pyrotechnic manufacturing.

EXPERIENCE: DND:

- Marine Weapon System Drive Controls
- Aircraft Smoke Signal Markers
- Marine Line Throwing Device
- Portable Antenna Masts
- Modular Practice Bombs
- Target System (remotely controlled)
- Software

DOC:

- Satellite M/W Parabolic Dishes

REVISED: Mar 90

VIDE ET TRAITEMENT CANADA Inc

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Boucherville, Quebec
Canada J4B 6H5

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Fax: (514) 655-5969

KEYWORDS: Applications Research (Process & Products), Heat Treating, Vacuum Heat Treating, Vacuum Gas and Oil Quenching, Tempering, Annealing, Stress Relieving, Homogenization, Solution Heat Treat, Normalization, Vacuum Furnace Brazing, Ionic Nitriding.

HISTORY. Vide et Traitement Canada is a Canadian French owned, high-technology, heat treating plant in Quebec, founded in 1987. The French group, Holding International de Traitement, has more than 30 plants in Europe and more than 20 years of experience in vacuum heat treating. They have made a joint venture in North America with the Canadian group, Holding Hamfab, who has been involved in paper mill industries more than 15 years.

CAPABILITY. Vide et Traitement Canada is primarily involved in vacuum heat treating of aerospace, aircraft, military, nuclear, and commercial parts. The company also gives technical support for research in process and product application involving heat treatment. The French division of Vide et Traitement Canada Inc has a research center in France which is at the disposition of the Canadian customer to perform research projects, and they also have a division that manufactures vacuum heat treating equipment. The company capabilities cover the broad areas of engineering, research and development, quality assurance, documentation, production, laboratory, and manufacturing of equipment.

AVERAGE WORK FORCE: Engineers - 2
Technicians - 5
Others - 5

GROSS SALES: 1988 - \$3.3K
1989 - \$6.0K

PLANT SIZE: 7,000 sq ft

EQUIPMENT. Digital and computer controlled heat treating equipment, vacuum oil Quench furnace, 2 ionic nitriding furnaces, and 5 vacuum furnaces.

EXPERIENCE. Present customers include aerospace, aircraft, military, nuclear, and commercial industries in Quebec, Ontario, and the USA such as Pratt & Whitney Canada, Heroux, Bendix Avelex, Textron Defense, Texas Instruments, Taylor Instruments, Bell Helicopter Textron, Hydro Ontario, and Remington.

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VIRTUAL PROTOTYPES Inc

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KEYWORDS. Rapid Prototyping, Man/Machine Interface, Computer Graphics; Expert Systems; Flight Simulation; Crew Station Design; Automatic Code Generation; Automatic Documentation Generation; Software Rehosting; Digital Terrain; Operability Prototype; Tactical Console, Virtual Cockpits, Human Factors Design, Graphics Editor, Touch Screen, Flight Control Interfaces, Out of Window Displays, Tactical Simulation; Performance Evaluation; Prototyping (Rapid).

HISTORY. Virtual Prototypes is a privately owned Canadian company incorporated in November 1980 under the name of Softec Consulting. The company changed its name to Virtual Prototypes Inc in 1985 to reflect its commitment to develop and promote its proprietary Virtual Prototyping technology. The company has a US subsidiary, Virtual Prototypes Inc, with offices in Dayton, Ohio, Dallas, Texas, and Long Beach, California.

CAPABILITY. Virtual Prototypes has developed a unique technology for rapid prototyping of control and display systems called VAPS (the Virtual Prototyping system). By using VAPS crew stations, cockpits and consoles are represented with touch-sensitive graphics and driven by real-time simulation. These 'virtual prototypes' have the same functionality as their real counterparts and may be connected to an existing customer simulation. The key benefit of the technology lies in its flexibility and ease of use. VAPS can be used by non-programmers to perform tasks that would normally require programming.

A strategic capability is automatic software generation and rehosting. VPI has the capability to develop operational MMI software between 10 and 25 times faster than possible with conventional technology.

VAPS is used in such diverse applications as cockpit prototyping, submarine combat system design, and the design of command, control, and communications consoles. Multiple VAPS systems can be interconnected to simulate larger systems, requiring cooperating operators. For flight applications, Virtual Prototypes Inc can supply a generic flight simulation model that can be parameterized to fly any type of fixed wing aircraft. For C3 applications, a flexible scenario generation and real time simulation capability is available.

VAPS has applications in concept exploration, visualization, and training. The company delivers VAPS as an off the shelf product. Virtual Prototypes Inc also provides engineering services involving the application of its technology to particular customer problems and training services.

AVERAGE WORK FORCE: Engineers - 35
Others - 30

GROSS SALES: 1988 - \$3.7M
1989 - \$5.6M

PLANT SIZE: 17,000 sq ft

EQUIPMENT: Silicon graphics super work station network, Virtual Prototyping System Design software, and simulation software.

EXPERIENCE: Present customers include various Canadian government departments and industries in Canada, the US, and overseas. Major customers include Northrop Corporation (Aircraft Division), NASA, USAF (Wright R&D Center), General Dynamics (Ft Worth Division), USN (Naval Underwater Systems Center, Naval Test Center, and NADC), USA (AVRADA, Human Performance Lab), Boeing Military Aircraft Co, Texas Instruments, Raytheon Co, McDonnell Douglas Helicopters, Lockheed, Rockwell/Collins, Honeywell, IBM Corp, Mitre Corp, GE Aerospace (RCA), Hughes Simulation, Aerospatiale, MBB, Royal Aeronautical Establishment, Aeritalia, GD/Electric Boat, Computing Devices Corp, and the Canadian Department of National Defence.

REVISED: Mar 90

VORTEK INDUSTRIES Ltd

ADDRESS: 1820 Pandora Street
Vancouver, British Columbia
Canada V5L 1M5

CONTACT: Dr G G Albach, President
Tel: (604) 251-2451
Fax: (604) 251-3356

KEYWORDS. Heating, High Intensity Light Source, Lamps (High Power), Laser Simulation, Semiconductor Processing, Solar Simulation, Thermal Testing.

HISTORY. Vortek is a private, Canadian company, incorporated in 1975 in the Province of British Columbia, with no other branches or US subsidiaries.

CAPABILITY. Vortek designs and manufactures the world's most powerful arc lamps and related optical systems. Production lamps are available with input powers up to 300,000 watts, using a patented internal cooling method. Radiant heating systems using these lamps are sold for production line semiconductor processing, large-area sunlight simulation, industrial heat treating, laser damage studies, and advanced thermal testing. Lamp production includes material handling, precision machining, electrical and mechanical assembly, and final testing. In-house R&D facilities are used for testing new product designs and for development of specialized lamp systems on a contract basis.

AVERAGE WORK FORCE. Scientists & Engineers - 5
Others - 15

GROSS SALES: No data.

PLANT SIZE: 10,000 sq ft

EQUIPMENT: The company has developed sophisticated fabrication techniques for liquid-cooled tungsten electrodes, and operates the only commercial tungsten electrode fabrication facility in Canada. Engineering of large, high-power optical systems is done in-house.

USAF, NASA, and DNA use Vortek lamps for laser development and radiation testing. Large-area solar simulators are installed in Canada and Europe.

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W R DAVIS ENGINEERING Ltd

ADDRESS: 1260 Old Innes Road
Ottawa, Ontario
Canada K1B 3V3

CONTACT Mr Gary D Roberts, Manager, Marketing
Tel: (613) 748-5500
Fax: (613) 748-3972

KEYWORDS: Engineering Services, Product Development; Prototyping; Infrared Signature Suppression, Testing/Test Equipment, Military Vehicle Engineering, Shock/Vibration Analysis, Thermodynamics Analysis, Manufacturing, Welding, Sheet Metal Rolling, Electronic Fabrication, LED Technology, Mechanical Fabrication, Finite Element Analysis, Software Development, Component Militarization, Feasibility Studies, Turnkey Systems, Project Management, Technology Assessment, Human Engineering; Documentation.

HISTORY W R Davis Engineering Limited was founded in 1975 as Davis & Associates. In 1980, the corporate name was changed to W R Davis Engineering Limited. Today the company continues to grow in all areas of electro mechanical engineering and production with significant expansion into international markets.

CAPABILITY W R Davis Engineering Limited was initially formed as a consulting engineering company to provide mechanical and electrical consulting engineering. This continues and the mechanical field can be further subdivided into stress, shock, vibration, heat transfer and fluid analysis, vehicle and human engineering, and mechanical component/systems design. The electrical field has branched into electronic system design, and control system design and analysis. Software development has been added to supplement other activities. A military engineering group which addresses land, air and naval applications, using the core mechanical and electrical groups has emerged. The military group has been enhanced with illustrators and technical writers to enable the production of technical documentation.

Hardware production and modification capabilities have emerged as a result of engineering projects. Specifically, the company can provide structural fabrication (including sheet metal rolling/forming) in steel, stainless steel and aluminum, vehicle modification and kitting, hydraulic systems fabrication and mechanical component/system fabrication. Electronic fabrication is available in a fully equipped laboratory.

Specific products are infrared signature suppression devices, wave generation systems for all sizes of test basins, active shaft grounding systems for naval vessels, a variety of vehicle test devices, low quantity production electronic systems, outfitted military special equipment vehicles, and vehicle data acquisition systems. Much work involves one of prototypes. Examples include vehicle test systems, light emitting diode lighting systems, a road roughness and rolling resistance test rig, a 7m long submarine model for wind tunnel testing and 10m high interactive displays for Expo '86 and a new drive system for the DCIEM Human Centrifuge.

Much of the design and build work performed by W R Davis Engineering Limited culminates with a test program. The company also analyzes, modifies and tests hardware provided by others. A comprehensive project involving protective masks is an example.

AVERAGE WORK FORCE: PhDs - 3
Engineers - 25
Others - 57

GROSS SALES: 1988 - \$9.0M
1989 - \$9.0M

PLANT SIZE: Manufacturing - 23,000 sq ft
Warehouse - 5,000 sq ft
Office - 15,000 sq ft

EQUIPMENT: W R Davis Engineering Limited's equipment includes:

- Test - Basic test equipment plus programmable data logger, mobile vehicle data acquisition systems (plus sensors). Use of external test facilities at Transport Canada Motor Vehicle Test Center, National Research Council, and Canadian Department of National Defense Naval Engineering, Land Engineering, and Quality Engineering Test Establishments.
- Electronic Laboratory - Electronics laboratory equipped for prototype and low quantity production and testing.
- Mechanical Shop - Equipped with the tools which include a full complement of welding equipment plus pinch-type forming rolls (1/4" stainless capacity), plate shear (1/2" x 10' mild steel capacity), 12' x 300 ton press brake, and 10,000 lb weld positioner.
- Computing Facility - PDP-11/23, VAX 730 and Micro VAX plus a full complement of PCs (12) and peripherals (plotters, laser printers). External access to PDP 11/73, Honeywell CP6, IBM mainframe and CYBERS. In-house software includes Primavera, PrimaVision, ANSYS, Symphony, Micro Soft Fortran Compiler, Tango, Smart Work, DBase IV, and the Harvard Project Manager.

EXPERIENCE: W R Davis Engineering Limited's customers include the Canadian Department of National Defense, Transport Canada, the National Research Council of Canada, St John Shipbuilding Ltd (Canadian Patrol Frigate Program), Pratt and Whitney Canada (DDH-280 Destroyer Update Program), David Taylor Research Center (US re Active Shaft Grounding), Texas A&M University (US re Wave Generation Systems), International Ship Study Company (West Germany re NFR 90), Construction Engineering Limited (US re Fabrication), Icelandic Harbor Authority (Iceland re Wave Analysis Equipment), KIA Motor Corporation (Korea re Automobile Test Services and Equipment), Daewoo Engineering Company (Korea re Korean Automobile Testing and Research Institute), and Hyundai Motors (Korea re Automobile Test Services and Equipment).

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WARDROP ENGINEERING Inc

ADDRESS: 6725 Airport Road, Suite #600
Mississauga, Ontario
Canada L4V 1V2

CONTACT: Mr Ernie Card, Vice President
Tel: (416) 673-3788
Fax: (416) 673-8007

KEYWORDS: Engineering Services, Feasibility Studies, Project Management, Computer Analysis, Software Engineering, Systems Engineering, Systems Integration, Reliability Analysis, Failure & Maintainability Analysis, Ground Support Equipment, Integration and Test Facilities, Microgravity Equipment, Environmental Testing, Robotics, Remote Handling, Prototyping, O&M Planning, Automation.

HISTORY: Wardrop Engineering Inc is a Canadian multi-disciplinary engineering company. Founded in 1955, it has grown to be a major engineering company providing diversified engineering services across Canada and internationally.

CAPABILITY: Wardrop Engineering provides a multi-disciplinary engineering service to aerospace and other high technology industries. Throughout our 35-year history, they have worked hard to maintain their

position on the leading edge of technology, striving for excellence in their service, their products, and their people. Wardrop offers a complete range of engineering services from their four offices across Canada, as well as international project offices, to a wide variety of clients. These services include feasibility studies, conceptual designs, prototyping, development, detailed design, fabrication, commissioning, and operating assistance. In addition, Wardrop designs, prototypes and develops specialized components, systems and mechanisms for the aerospace and related industries. The company also provides systems integration, numerical analyses (stress, thermal and seismic), reliability analyses, as well as failure and maintainability analyses. In addition, they have expertise in electronics, instrumentation and control systems, as well as software engineering. Areas of specialization within the aerospace industry include ground support equipment, integration and test facilities, equipment and facilities for micro-gravity research, environmental test facilities, robotics, and automated remote handling.

AVERAGE WORK FORCE: Professional Engineers – 102
Technicians & Technologists – 98
Others – 36

GROSS SALES: 1988 – \$13.5M
1989 – \$15.0M

PLANT SIZE: 30,000 sq ft

EQUIPMENT Wardrop Engineering employs VAX and IBM in-house computer systems for engineering, analysis, engineering computations, as well as computer aided design and drafting.

EXPERIENCE: Wardrop Engineering has 35 years' experience providing engineering services to high-technology industries within Canada and internationally. Representative projects undertaken by their staff in the aerospace field include:

- Conceptual design of mechanical ground support equipment and integration and test facilities for the mobile servicing system – Canada's contribution to NASA's Space Station.
- Engineering assistance with the JEMRMS, the remote manipulator associated with the Japanese experimental module on NASA's space station.
- Detailed design of mechanical ground support equipment for ANIK-E Communications Satellite.
- Design for furnace and other facilities for materials processing and manufacturing in micro-gravity.
- Design, development and supply of ground support equipment and integration and test facilities for the Space Shuttle Remote Manipulator System (CANADARM).
- Preliminary design of STARLAB – the Australian/Canada/US Space Telescope.
- Design, analysis, prototyping, development and supply of various mechanisms, rigs, fixtures and components for the aerospace industry.

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WELDCO-BEALES

ADDRESS: 116 East 2nd Avenue
Vancouver, British Columbia
Canada V5T 1B5

CONTACT: Mr David J Chernenko, Sales Coordinator
Tel: (604) 873-4741
Fax: (604) 873-5140

KEYWORDS: Special Buckets; Pallet Forks; Operator Safety Enclosures, Armored Personal Cabs, Mine Clearing Blades, Tank Blades

HISTORY. Weldco-Beales is a Canadian-owned, heavy equipment manufacturing company. Weldco-Beales presently operates six manufacturing facilities across North America. The merging of two organizations, Weldco and Beales, two companies with many years' experience, created a product line well established in the market place with the attachments being used in forest, mining, and construction.

CAPABILITY. Weldco-Beales is primarily involved in the design and manufacture of mobile equipment attachments. They also design and build ballistic-proof operator enclosures and special land-clearing product types. Weldco-Beales' productive manufacturing area is over 200,000 square feet. Each facility is equipped with modern fabrication equipment such as computer numerically controlled lathes and quality control equipment. Our creative engineering design experience drives computer aided drafting and results in innovative solutions for every customer problem. As a custom manufacturer, Weldco-Beales' potential design and manufacturing capabilities are endless.

AVERAGE WORK FORCE: Engineering – 30
Office Administration – 60
Shop – 300

GROSS SALES: 1989 – \$42.0M

PLANT SIZE: 40,000 sq ft each plant

EQUIPMENT. Typical shop equipment in each plant includes 4 boring mills 72" x 120" capacity, 2 CNC lathes 24" x 24" capacity, 2 shears 1/2" x 12" capacity, 2 brake press 16" x 500 ton capacity, and 8 overhead cranes, 10 ton capacity.

EXPERIENCE. Canadian Armed Forces, US Department of Defense, Canadian Coast Guard, Caterpillar Inc, and John Deere.

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WESTERN PROPELLER COMPANY Ltd

ADDRESS: #200 – 2451 Clearbrook Road
Clearbrook, British Columbia
Canada V2T 2Y1

Shop Locations:
#124 – 7080 River Road
Richmond, British Columbia
Can. Ia V6X 1X5

Box 6333, Station C
7940 Yellowhead Trail
Edmonton, Alberta
Canada T5B 4K7

206 Saulteaux Crescent
Murray Industrial Park
Winnipeg, Manitoba
Canada R3J 3W3

2283 Anson Drive
Mississauga, Ontario
Canada L5S 1G6

CONTACT: Mr K Gary Sloane, President
Tel: (604) 853-8704
Fax: (604) 853-3135

KEYWORDS. R&O (Propellers), Governors (Propeller); Controllers (Propeller); Non-Destructive Testing.

HISTORY. Western Propeller Company Ltd and associated locations are wholly owned Canadian corporations dating back to 1948. Economics and qualified staff allowed for expansion to Winnipeg in 1957, Mississauga (Toronto) in 1969 and to Richmond (Vancouver) in 1980.

CAPABILITY. Within the corporations, Western Propeller provide sales, overhaul and repair to all Hartzell propellers and governors, all McCauley propellers and governors, all Woodward governors, all Dowty

Rotol propellers, Hamilton Standard propellers and governors up to Douglas DC-6, including deHavilland Dash-7 and Dash-8 aircraft.

AVERAGE WORK FORCE: Licensed Engineers – 8
Administration – 7
Others – 40

GROSS SALES: 1988 – \$6.5M
1989 – \$6.7M

PLANT SIZE: 55,000 sq ft (4 locations)
1,000 sq ft (Admin Office)

EQUIPMENT. All, but not limited to, manufacturers required working tools, test equipment and manuals. Further in-house upgrading to state-of-the-art digital equipment as available. Latest NDT procedures, equipment and training.

EXPERIENCE. Western Propeller Company Ltd's long term customers include:

- Canadian Government (Department of Supply & Services), Royal Canadian Mounted Police, and Ministry of Transport – contractual sales, overhaul & repair.
- Time Airways (Airline) – open market customer.
- Air Canada (Airline) – contractual NDT work.
- Provincial Government Air Services across Canada – open market customer.
- Field Aviation (FBO) – open market customer.
- Air Ontario (Airline) – open market customer.

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WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT

ADDRESS: Pinawa, Manitoba
Canada R0E 1L0

CONTACT: Mr C W Zarecki, Manager, Commercial
Operations Office
Tel: (204) 753-2311
Fax: (204) 753-8404

KEYWORDS: Algorithm Development, ASME Codes, Biological Environment; Chemical Analysis; Chemical Processing; Chemistry; Colloid Chemistry, Combustion Research, Computer Code Development, Corrosion Science, Damping Measurements, Derived Release Limits, Detonation; Disposal (Nuclear Waste), Electrochemistry, Electronics Nuclear; Environment; Explosions, Fluid Dynamics; Fracture Mechanics; Health Physics, Hydraulics, Instruments (Nuclear), Internal Friction Technology, Irradiations, Isotopes, Materials Characterization; Materials Testing & Development; Mechanical Testing; Medical Biophysics, Mathematical Modelling; Metallography; Metallurgy; Neutron Activation; Non-Destructive Testing, Nuclear Engineering; Nuclear Waste Management, Physics, Quality Assurance, Radiation, Radiation Shielding, Radioactive Wastes, Rail Transport, Reactors, Risk Analysis, Separation Processes, Surface Chemistry; Surface Topography Analysis; Tailings; Thermal Analysis; Toxic Chemicals; Trace Analysis; Vitrification; Waste Management.

HISTORY. The Whiteshell Nuclear Research Establishment (WNRE) came into being in 1963 for the purpose of developing the organic-cooled nuclear power reactor concept. WNRE is part of the Atomic Energy of Canada Research Company (AEC-RC), which in turn is a part of Atomic Energy of Canada Ltd (AECL). The latter is a crown corporation of the Government of Canada.

Canada's nuclear program had its beginning during the Second World War when a team of Allied scientists was assembled in Montreal for

work related to the development of atomic weapons. With the end of the war, the Canadian effort was redirected, and since then all work on atomic energy has been concerned with peaceful uses.

The program was initially administered by the National Research Council of Canada, but by 1952 it had expanded so much it was placed under a new, specialized organization (AECL). In the fall of 1979, a commercial Operations Office was established at WNRE for the purpose of marketing site services, products, and transferring technology.

AECL pursues a wide range of activities, from basic science to wholly commercial operations, with the main effort being devoted to the development, testing, commercialization, and marketing of CANDU reactors, heavy water, isotopes, irradiation equipment and nuclear fuel.

AECL is a Crown Corporation with a total staff of approximately 6500 people. The Corporate Office is located in Ottawa, Ontario.

CAPABILITY. WNRE is an research and development site. It performs fundamental and applied research; develops processes, products, and components; and has a large staff of experienced people in most disciplines and trades. Their greatest asset is the ability to innovate, develop, test, commercialize, and market a concept.

AVERAGE WORK FORCE: Professional – 300
Technical – 330
Clerical – 175
Prevailing Rate – 200

GROSS SALES. \$80M (including government) annually

PLANT SIZE: Approximately 10 major buildings which house R&D facilities, engineering offices, machine, construction, and maintenance work shops; administrative offices; protective services, fire department, and stores and warehousing. Very rough area of all facilities is 150,000 m².

WNRE has a variety of facilities and expertise available for undertaking commercial work, e.g.:

- Other irradiation devices – a gamma-irradiator, Van de Graaf accelerator, and an electron beam irradiator.
- "Hot Cell" facilities capable of handling up to 1 million Curies of radioactive material.
- Various hydraulic test "loops" for materials, component, and corrosion testing.
- Internal friction technology laboratory specializing in damping vibration and internal friction measurements and the application of these to benefit industry by reducing vibration and/or noise
- Comprehensive metallurgical and mechanical testing facilities with expertise in testing ferrous and non-ferrous metals, ceramics, glasses, rocks, and composites
- Surface topography facilities for detailed measurement and analysis of surface characteristics using both contacting and non-contacting technology
- Expertise in electron microscopy, acoustic emission, fracture mechanics, etc., that can be applied to solving problems involving deformation, hydrogen embrittlement, stress corrosion cracking, creep cracking, and fracture.
- Extensive analytical chemistry facilities including micro-analytical, radiochemical, neutron activation, mass spectrometry, atomic absorption spectroscopy, plus a strong capability for the characterization of surfaces by such means as scanning electron microscopy, scanning auger microscopy, secondary ion mass spectrometry, and photoelectron spectroscopy
- A research chemistry group adept in the measurement of the thermodynamic properties of solutions at high temperature and pressure, in the application of electrochemical techniques to the study of corrosion and film formation, in the study of gas phase reactions, and in several areas of colloid and surface chemistry.

- Combustion test facilities to study the detailed deflagration and detonation behavior of mixtures of combustible gases from the fundamental chemistry of combustion to engineering scale verification or demonstration experiments.
- Expertise in algorithm development and mathematical modelling to solve a variety of problems in mathematical and applied sciences.
- Environmental research laboratories and field test facilities with experienced staff to study the impact of chemical and radioactive effluents of the environment.
- Biophysical research laboratories with expertise in virology, cell biology, radiobiology, biochemistry, and biophysics
- A geotechnical research capability which includes an underground research laboratory for excavation damage experiments for different excavation techniques, development of in-situ stress measurement techniques, evaluation of rock thermal/mechanical properties, hydraulic conductivity and rock porosity measurements, and various geochemistry experiments.
- Expertise in modelling fluid heat transport systems and high pressure steam/water behavior.
- Consulting service groups encompassing nuclear engineering, risk analysis, development of computer models, mathematical analyses, and meteorological assessments.

EXPERIENCE. AECL has been in existence for approximately 40 years. During this time, it has developed the CANDU-pressurized heavy water reactor system. It has helped to commercialize the radioisotope industry in the medical, pharmaceutical, and industrial fields and developed and commercialized the Canadian heavy water industry. Canada is currently the world's largest producer of this commodity. In addition, AECL has been instrumental in developing the Canadian nuclear fuel industry and has played a large part in developing the US nuclear fuel designs, for both military and civilian reactors. It has also played a major role in developing and commercializing zirconium alloys.

More recently, AECL has been charged with the responsibility of managing the Canadian Waste Management program. It includes conceptual planning, fundamental research, development, testing, piloting, verification, acceptance, optimization, and providing specifications for the commercial system. Spent fuel storage (wet and dry), transportation, fission products removal, and waste disposal are subsets of the total program. All of this work is being coordinated from WNRE. AECL's major assets are experienced staff and state-of-the-art facilities and equipment. Its reputation as a respected leader in the nuclear and non-nuclear industries is acknowledged both domestically and internationally.

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WILLIAMS ESG Inc

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Nepean, Ontario
Canada K2E 7Y1

CONTACT: Mrs Cynthia C Vincent
Tel: (613) 723-5896
Fax: (613) 723-5899

KEYWORDS. TEMPEST, EMI, Fiber Optic Communication Equipment, COMSEC, Ruggedized Equipment, EMC, Sheet Metal Fabrication and Design, Software Engineering, Engineering Support, Turnkey Systems, Equipment Modification (TEMPEST), Documentation (MIL-STD), Project Management, Technical Support.

HISTORY: WILLIAMS ESG is an entirely Canadian-owned, engineering and manufacturing company specializing in services and products for the secure TEMPEST marketplace and defense industries. Founded and incorporated in October 1988, WILLIAMS ESG has experienced

rapid growth, and in December 1989, the company purchased DTI Precision Products, a company specializing in custom design and sheet metal work.

CAPABILITY: WILLIAMS ESG Inc is primarily involved in the design and manufacture of RF shielded and rugged products, including EMI cabinets and fiber optic communication equipment for applications in TEMPEST, EMI, and field deployable/airframe equipment. The company also provides services in precision sheet metal fabrication and custom design; engineering support (such as system design and integration, project management, proposal analysis and preparation, TEMPEST design and documentation), turnkey systems (complete systems requiring no additional work by the client), modification of commercial equipment to meet TEMPEST standards; documentation (drawing packages to MIL-STD 100, acceptance test plans, test reports, maintenance, installation, system control plans), project management and technical support; engineering software development; manufacturing (CAD/CAM/CAE, electronic and mechanical assembly, shearing, punching, forming, sanding, finishing, painting, silkscreening), and research and development.

AVERAGE WORK FORCE: Engs - 4
Tech - 12
Others - 45

GROSS SALES: 1988 - \$0.4M
1989 - \$2.8M

PLANT SIZE: 18,000 sq ft

EQUIPMENT: Harris HXC-5 minicomputer; IBM compatible workstations, Macintoshes, CNC equipment and machine shop, computer aided design, manufacturing and engineering systems (CAD/CAM/CAE), electronic and mechanical assembly, sheet metal forming equipment, RF test equipment, standard electronic lab equipment.

EXPERIENCE. Present customers include the Government of Canada, Digital Equipment of Canada, Northern Telecom, Telesat Canada, Canadian Astronautics Limited, Mitel, and Bell Northern Research.

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WINDSOR AEROSPACE (Division of Hawker Siddeley Canada Inc)

ADDRESS: 204 East Pike Creek Road
PO Box 100
Emeryville, Ontario
Canada N0R 1C0

CONTACT: Mr Keith Branton, Director of Marketing
Tel: (519) 727-6666
Fax: (519) 727-6238

KEYWORDS: CNC Machining; Gear Boxes; Gears; Landing Gear Components; Machining; Missile Components; Precision Machining; Radar Drives; Shaft Assemblies.

HISTORY: Windsor Aerospace was incorporated in the Province of Ontario in 1975 as a division of Bachan Aerospace Corporation. The company is owned by Hawker Siddeley Canada Inc of Mississauga, Ontario.

CAPABILITY: Windsor Aerospace is a modern manufacturer engaged in the design, fabrication, and test of gears, gear boxes, and precision assemblies for the aerospace and defense industries. Windsor Aerospace maintains a complete gear facility for design, manufacture, and test of gear boxes, precision spur, helical, and bevel gears. This facility includes CNC machining, gear grinding, and gear inspection equipment. Windsor Aerospace operates to MIL-Q-9858A.

AVERAGE WORK FORCE: 75

GROSS SALES: 1988 - \$5.8M
1989 - \$6.2M

PLANT SIZE: 35,000 sq ft

EQUIPMENT: CNC machining and turning centers, gear cutting, grinding and lapping equipment, OD grinding, ID grinding, surface grinding, milling, lathes, cutting, computer coordinate measuring machine, gear checking equipment, NDT testing, copper plating, and complete inspection facilities.

EXPERIENCE: Windsor Aerospace has manufactured flap actuator gears for the Boeing 767, pump gears for Pratt & Whitney's JT 15, PT 6 and PW 100 engines, gas turbine disks for United Technologies Power Systems Group, cable and shaft assemblies for the Bendix FJ-A fuel control system, and Radar Azimuth Drives for Norden systems and for Raytheon. Windsor Aerospace has been surveyed and approved by Avco Lycoming, Bendix Energy Control, Cleveland Pneumatic, General Dynamics, Hamilton Standard, Hawker Siddeley, McDonnell Douglas, Norden, Pratt & Whitney, Plessey Dynamics, Rolls Royce, Sunstrand Aviation, TRW Power Accessories, Boeing, Menasco, and Bell Helicopter.

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ZARGES AFC CANADA Ltd

ADDRESS: 3839 Burnsland Road, S E
Calgary, Alberta
Canada T2G 3Z4

CONTACT: Mr Brent Rawlinson, President
Tel: (403) 287-1311
Fax: (403) 243-5603

KEYWORDS: Armament (Cases); Cases (Custom); Custom Packaging; Packaging (Custom); Test Equipment (Cases); Medical Equipment (Cases); Instrumentation (Cases).

HISTORY: Zarges AFC Canada Ltd is a Calgary-based, Canadian-owned company incorporated in 1980.

CAPABILITY: Zarges specializes in the manufacture and distribution of custom cases, containers, and transport systems for military and civilian applications. All manufacturing is to NATO standards.

AVERAGE WORK FORCE: Total - 20

GROSS SALES: No data.

PLANT SIZE: 7,000 sq ft

EXPERIENCE: Zarges products are currently in use with the Armed Forces of West Germany, Austria, Sweden, Italy, Canada, England, and the Netherlands. Cases are fabricated for electronics, medical equipment avionics, test and calibration equipment, optical, weapons, etc. Interiors can include special foam liners, aluminum dividers, tray, rack mounts, and shock mount systems.

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